# CHAPTER ONE

# INTRODUCTION

## 1.1 BACKGROUND TO THE STUDY

Facilities management (FM) is concerned with planning, designing and managing buildings as well as their support systems, equipment and furniture in order to enhance an organization's ability to compete successfully (Becker, 1990). FM is about taking control, adding value, supporting the business and ensuring that the space and working environment enhance and not impede productivity of the staff and the core activity (Wiggins, 2010).

FM evolved from traditional building support service (BSS) practices such as maintenance management, corporate real estate management, property management and asset management among others. It is an umbrella practice that incorporates other BSS disciplines. That is why it is described as a practice that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology (International Facilities Management Association [IFMA], 2006). The evolution of FM is in response to the dramatic changes in the office environment particularly the new knowledge economy which resulted from the introduction of computers in the 1960's and the energy crisis of 1970's (Williams, 2003 and Wiggins, 2010). Some other reasons for this growth are: global competition forcing companies to focus more on core business areas, high cost of space and premises, security issues, high costs of health, rapid transition in information technology etc.

The strategic and proactive nature of FM makes it different from these other building support services. FM implements company policies on property issues and adopts strategic cost control and service performance level control mechanisms in its operations. The Facilities Manager

assumes the role of the intelligent client (Williams, 2003) and as the champion of the end user's need (Wiggins, 2010) his main focus is supporting the objectives of the building occupant, a responsibility which usually includes managing the physical assets.

The current global economic downturn has forced company executives to look towards their internalised competitive advantage in order to sustain their businesses. Consequently, there are on-going attempts to try to identify major improvements to facilities and support services that will enhance staff productivity and invariably the profitability and sustainability of businesses. This is in the recognition that it is no longer the task-oriented worker of the industrial ages but the knowledge workers that are major creators of competitive advantages, wealth and jobs (Druker, 2002 and Levin, 2005). Ware and Grantham (2003) are of the opinion that the integrated management of the knowledge workers' workplace, technology tools and infrastructure can reduce staff support cost by 30%. Good quality FM provision allows office buildings to meet the ever changing demands of the knowledge economy and is perhaps the required solution that company executives seek. Particularly, in view of the attendant effects that effective FM service has had on the prosperity of economies of developed nations where FM practices are already well developed, such as Japan, United States of America (USA), The Netherlands, Australia and to a reasonable extent the UK (Alexander, 2003 and Drion, Mellisen and wood, 2010).

In view of the potential advantages of FM, there is increasing clamour to carve out strategic roles for it in organisations in Nigeria. Ideally, decisions of this nature that involves major changes to organisational process should not be made without quantitative evidence of the effect that FM has on performance of buildings in the Nigerian socio-cultural and economic

context. This is more so as the effect of FM within an economy has been found to vary with the current trends and context of its application (Lavy *et al*., 2010). Therefore, it will be useful to have quantitative evidence that a positive relationship presently exists between FM output and performance of buildings services in Nigeria. This will make it easier to convince stakeholders of the need to embrace FM. This information will also guide organisational executives and the legislative arm of government in formulating policies for building operations that could enable the application of FM play important roles towards economic stability. It is in the light of this background that the problem of this study is presented.

## 1.2 STATEMENT OF PROBLEM

Literature indicates that as at the turn of the millennium, FM provisions add significant value advantages to the buildings, facilities and businesses of organizations in countries like Japan, Australia and USA (Alexander, 2003). In contrast, its value effect was almost insignificant at that time in countries such as China (Gilleard and Yiqun, 1999); Asia pacific (Heywood, Smith Brawn and Missigham, 2000); Sweden (Tuomela and Puhto, 2001) and Malaysia (More and Finch, 2004) etc. According to these authors, when the FM practice in an economy is in its infancy, it grapples with janitorial and operational activities which make it less effective. As it matures, it becomes more strategic and effective, thereby improving the performance of the facilities and business of the client organization. Therefore, it will be erroneous to assume that FM adds significant value in all contexts and in view of this it becomes important to examine the value effect of FM in different socio-economic context.

In this realization, many studies have sought to evaluate the value effect of FM on buildings, facilities and organizational performance in different socio-economic contexts such as the UK,

Australia and other European countries (Grimshaw and Keefe, 1992; Spedding and Holmes, 1994; Amaratunga, Baldry, and Sarshar, 2000; Nwankwo, Owusu-Frimpong, and Ekwulugo, Okoroh *et al*, 2001; Fielder, 2004; Heywood, Smith, Brawn and Missigham, 2004 and Meng and Minogue, 2011). On the contrary, no attempt has been made to empirically establish the contributions of FM to building or organisational performance, within the Nigerian socio-economic and cultural contexts.

Ideally, value effects of FM practice should be discernible from measuring the effectiveness of the practice and the resultant effect of these on the performance of the facilities of the client organization. Measurement of performance in FM cannot be informative and could actually be misleading where inappropriate indicators (measures) have been used. In recognition of this, many studies have attempted to identify important measures of the effectiveness of FM in different countries (Barret, 1995; Hinks and McNay, 1999; Amaratunga *et al*, 2000; Shohet, 2006; Moss, Alho, and Alexander, 2007 and Lam et al, 2010). Facilities management application in Nigeria is constrained by particular socio-economic and cultural conditions such as low ICT integration, inadequate infrastructural development and poor financial disclosures (Umoren, 2009 and Games, 2011). Others are poor management of building and public service emergencies, poor regulatory and standardisation policies and enforcement. These constraints makes FM application in Nigeria prone to crises such as, incessant breakdown of machinery and equipment, distortions in supply of utilities, building collapse and fire incidents, which creates a greater need to develop a contextual scale of measures for evaluating its effectiveness. In spite of the realization that the above constraints could significantly influence the list of measures for the effectiveness of FM and the measurable value effect of its application, no empirical study has been undertaken to identify the appropriate measures for

evaluating the effectiveness of FM in Nigeria. The few empirical studies that have been done focused on the FM perspective of the management of different types of properties and the examination of some FM concepts such as benchmarking, sustainability, lifecycle costing and their applications (Durodola, 2008; Adewunmi, Omirin, and Adejumo, 2008 and Adejumo, Adewunmi, and Omirin, 2009). Some other studies focused on the role of the estate surveying practitioner in FM and the level of professionalism of the Nigerian FM practice (Udo, 1998; Sanni, 1998 and Mbamali and Adebayo, 2005). Other studies only referred to anecdotal evidence on the impact of FM applications to building and organizational performance (Odiete, 1998; Fatoki, 1998 and Ojo, 2002).

Therefore, the underlying problem that this study sets out to solve is to develop a multi-item scale of measures for evaluating the effectiveness of FM that is relevant to the Nigerian socio-economic context and using this scale, evaluate the direct effect that FM has on the performance of office buildings in the Nigerian environment. This enabled the development of a tool for quantitative evaluation of building performance.

## 1.3 RESEARCH QUESTIONS

The research aim at providing answers to the following questions:

- What key measures of effectiveness of facilities management service are relevant to the study area?
- What is the level of performance of office buildings in Lagos metropolis? Is the performance significantly less than satisfactory?
- Is there any significant difference between the performance of office buildings which adopt strategic facilities management principles and those that do not?

- What is the relationship between the degree of effectiveness of facilities management service and office building performance?
- What model can be developed to assess the impact of effectiveness of facilities management service on office building performance?

## 1.4 AIM & OBJECTIVES OF THE STUDY

The aim of the study is to evaluate the influence of FM on performance of office buildings, with a view to developing a tool for calibrating building performance, reflecting the peculiarities of FM application in the Nigerian context.

The specific objectives of the study are:

i) To identify key measures of the effectiveness of facilities management service that are relevant to the study area

ii) To evaluate the performance of office buildings in Lagos metropolis and determine if this is significantly less than satisfactory

iii) To compare the performance of office buildings which adopt strategic facilities management principles with those that do not

iv) To evaluate the relationship between the effectiveness of facilities management service and office building performance in the study area

v) To develop a model for predicting the relationship between facilities management service and office building performance.

## 1.5 RESEARCH HYPOTHESES

The following four hypotheses (hypotheses 1 to 4) were tested for objectives 2 to 5 respectively.

1. Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory.
2. There is no significant difference between the performance of office buildings which adopt strategic facilities management principles and office buildings that do not.
3. There is no significant relationship between effectiveness of facility management and office building performance.
4. The effectiveness of facilities management is not a significant predictor of performance of office buildings.

## 1.6 SIGNIFICANCE OF THE STUDY

This study identifies key measures for the level of effectiveness of FM that are appropriate to the Nigerian context. This will provide Nigerian FM practitioners with appropriate criteria for evaluating the effectiveness of their services. The study widens the scope of existing measures of effectiveness of FM beyond that of previous researches by featuring measures that are unique to the Nigerian crisis and emergency context. This will help to ensure that findings of FM effectiveness assessments are not misrepresentative or confusing. As a consequence, areas of improvement can be easily identified so that the overall performance and value adding ability of FM services within the nation can be enhanced. The identified measures would also enable practitioners and building owners to identify key aspects of the output of the FM services that are required by building user.

This study establishes empirical and quantitative evidence that improvements in the effectiveness of the FM service in an office building results in significant improvements in the performance of the building. Finally, this provides BSS providers with a strong point of

argument with which to convince executives of organisations to provide more funds for the operations of their buildings and facilities. Hence, this study brings to the fore the import of FM application particularly in view of its attendant effect on the performance of buildings, the users and invariably performance of the organizations occupying them. Undoubtedly, many organizations particularly small and medium scale enterprises that are on the brink of collapse as a consequence of current unfavourable global and national economic situations (Kuteyi in Alster 2007 and Aina 2005), could have been saved if they had access to research information on how to improve productivity and profitability through application of strategic FM principles as a required amendment to their organizational processes.

Also, this study develops a bespoke model which could serve as a veritable tool for evaluating the performance of office buildings that is relevant and easy to use in the Nigerian context. The tool is also devoid of the problems of applicability in Nigeria that the existing tools have. This will afford Nigerian FM practitioners an opportunity to measure their effectiveness and the performance of the buildings they manage against performance of contemporaries and established benchmarks. Invariably, these will improve their performance, enhance sustainability of their practices and consequently improve employment levels within the economy. Also, the average financial performance values that were obtained from this study could serve as "first strike" benchmarks that could provide a firm basis for further works on financial benchmarks in Nigeria.

This study indicates attributes of office buildings that are performing least satisfactorily and hence require attention. It also indicates needs for improvements in building operations by indicating that office buildings in the study area are performing significantly less than

satisfactory. Hopefully, this realisation will stir the practitioners towards improved performance which invariably will improve the contributions of FM towards economic posterity in Nigeria.

## 1.7 SCOPE AND DELIMITATION OF THE STUDY

Only few studies can comprehensively examine all aspects of a research topic. Most studies can only examine particular aspects at a time. This study is no exception in this regard. It therefore becomes necessary to explicitly define the study limits and clarify the scope from the perspectives of the subject theme, industry requirements and geographical coverage as was achieved in this section.

The research covers purpose built office buildings in six (6) of the 20 local governments areas in the state where offices are most prominent (Lagos State Government 2011). These are Apapa, Eti-Osa, Lagos-Island, Lagos-Mainland, Ikeja and Kosofe local government areas all within the metropolitan areas of Lagos State. This research is limited to Lagos metropolis because of its unique features. Lagos metropolis is the hub of commerce in Nigeria. It harbours over 2000 manufacturing organizations and 200 financial institutions, including the nation's premier Stock Exchange. It is also where the nation's monetary authorities such as the Central Bank and the Security and Exchange Commission are located. In addition, 23 out of the 25 banking institutions in Nigeria have their head/regional offices in Lagos metropolis (Lagos State Government, 2011). This implies that several organizations and buildings that require facilities management services are located in this area. Therefore, it is presumed that any demonstrable value adding edge of FM can be better observed within Lagos metropolis

and that finding from this study area can provide a veritable guide to other parts of the country.

The research is limited to office buildings because majority of existing studies on FM associate it with effective working environments and offices are generally recognized as such. In particular, offices are the recognized working environment of the knowledge workers who in this era of information technology and globalization are responsible for the development of creative economic and productive ideas which culminates in job creation, improved national income and productivity. In view of this, it is presumed that in spite of the relative infancy of the FM practice, the effect if any will be more readily observable within office buildings.

This research examines building performance in terms of the performance of the building structure on the one hand and the support services on the other. Therefore it covers the full extent of FM services including those that may not have direct implications on buildings and their services (but on users) such as mail service, transportation, catering, reprographics, business analysis and financial services.

Building performance can be measured from three major perspectives i.e. financial (hard measures), non–financial user satisfaction (soft measures) and the more contemporary and developed world based environmental sustainability perspectives. The focus of this research is the intangible user satisfaction perspective and although the research examines the financial perspective of performance the depth is limited by prevalent poor financial disclosures. The research did not examine the environmental sustainability perspective because currently this perspective is largely absent in Nigerian building operations practices (Adewunmi, Omirin and

Koleoso, 2012). Presumably, an attempt to examine this perspective could only provide inconclusive information.

The research is not limited to buildings or BSS practitioners within any particular industry. Therefore it includes buildings occupied by respondents who work in different industries such as finance, oil and gas, insurance, commerce, communication, parcel service etc. This is to make it possible to generalize the findings beyond offices in any single industry. The sample for this research also includes both private and public sectors buildings and rented and owner occupied buildings. These are also in an attempt to improve the generalization of results.

This research examines the effect of FM on building performance rather than company performance. This was basically for three reasons. Firstly, it is important for researches to establish that FM has some recognizable impact on building performance under its current scope of practice in Nigeria before moving further to investigate its influence on company performance. Secondly, due to the emerging nature and scope of the practice of FM in Nigeria it would be easier to measure the impact of FM on building performance without significant bias than to measure its impact on company performance because FM has more direct, recognizable and measurable impact on buildings than on organizational performance. The difficulties of evaluating the effect of FM on organisational performance are recognised even in the developed nations where the FM practice is more strategic (Clark, Haynes, Pinder, and Price, 2004). Furthermore, focusing on effect of FM on building performance falls more within construction management subject area under which the Ph.D. research is being conducted.

## 1.8 LIMITATIONS OF THE STUDY

Difficulties were encountered with obtaining information because of respondents' poor information disclosures and attitude to research. Corporate confidentiality policy issues also made it difficult to get relevant information and participation particularly from the banking and oil industries. In particular, only limited information was provided on financial performance by the respondents in the sample despite several attempts and efforts to encourage disclosure. This constituted a great hindrance to this research, to the extent that the financial performance of the building samples had to be treated separately, in developing the building performance value model described later in this research, instead of it being included with the non-financial customer satisfaction measures, as indicated in the conceptual framework.

## 1.9 DEFINITION OF OPERATIONAL TERMS

**Facility**

These are assets of an organization, i.e. a building or office complex with all the attendant physical components. They are something built, installed or established to serve a purpose. Building premises are component of facilities along with the support service.

**Purpose Built Office Buildings**

An office building is a built structure that serves as a work place and accommodates the administrative, information and knowledge processing activities of an organization such as supervising, directing, decision making, communication, filling etc. For the purpose of this research, "office buildings refer to the physical structure which provides the work place

enclosure as well as the public areas, mechanical systems, fixtures and fittings, equipment, furniture as well as other building and staff support provisions.

Purpose built offices are conceived, planned, designed and developed as an office building and is utilized strictly for office related purposes. A building designed or built for some other purposes other than office such as residential, manufacturing or trading, but later converted to office is not purpose built.

**Facilities Management**

This can be defined as the process through which the premises and services required to support core business activities are identified, specified, procured and delivered. FM involves significant strategic facilities planning and implements company policies on property issues. Facilities management focuses on the building occupier and adds value to the client organization by improving processes through which workplaces can be managed to inspire people to give their best.

**Building Support Service (BSS) Provider**

This was used to refer to any personnel or staff of the department involved with or in charge of providing the non-core support services for facilities within or from outside the organisation. Support services include support to staff; to the assets (equipment, fixtures and fittings) of the organization, as well as business support. The list of practitioners under this category includes the facilities manager and other traditional building support service practitioners such as the asset manager, property manager, corporate real estate manager, maintenance manager or

other people working in these capacities or in the respective departments of these practitioners such as technicians, maintenance officers etc.

**Occupiers/Users of Office Buildings**

Building occupier / users are members of staff of the organisations who occupy the building for productive activities. They include junior, middle level employees as well as senior managers or executives of these organisations. For the purpose of this research an office occupier / user excludes visitors to the building.

**Facilities Manager (FM Service Provider)**

A facilities manager is a building support service provider who adopts facilities management principle in providing support service such that he adds value to the client organization. He focuses on the occupant of a workplace and the space and services supporting her / his work or company`s production. Hence the main object of the FM practice is space and service. However, due to its infancy, FM in Nigeria focuses more on janitorial and operational issues which makes it quite similar to other traditional BSS practices. Hence, it is presumed that all BSS providers within the study sample practices some form of facilities management and are regarded as facilities managers for the purpose of this study.

**Traditional Building Support Service Providers**

These are service providers who adopt any of the other facilities or premises operation principles apart from FM. They do not adopt strategic value management approaches and tend to be more reactive than proactive. Unlike in FM, the main focus is not the need of the building occupiers and their productivity rather, it is maximizing exchange value of property

(for the estate manager), maximizing income from real estate entities (for the asset manager), providing appropriate working environment for the least possible cost (for the corporate real estate manager) and maintenance of equipment, engineering provisions and other business assets (for the maintenance manager). While the main object of these practices could be any of capital, income return, the physical building, equipment, technicians, company assets etc. that of the facilities manager is space and building services.

**Strategic FM Service Provider**

When FM is in its infancy, it grapples with janitorial and operational issues. With increasing maturity it evolves through the tactical into the strategic stage where it implements organisational objectives on property issues. A facilities manager who utilises Strategic FM Principles provides the intelligent client function, which starts with intelligence gathering on user's needs and the organization's mission, from where it moves on to the stage where policies are created and finally to the procurement and delivery stage – the supply chain. He provides the essential link between the sponsors of facilities operation and service providing contractors.

**Strategic Facilities Management**

This is the application of strategic FM principles in the management of facilities. It commences with immense strategic facilities planning and use of value management approaches in the development of a value managed facilities policy that has direct reference to the corporate mission and needs of the users of the facilities. Examples of such value management approaches include strategic procurement of services and materials and application of performance monitoring and control strategies, such as incentive and punitive

payment schemes. In strategic FM, the activities of the BSS providers are guided by the facilities policy which would expectedly specify the mission, strategies and tactics of the operations. It would also indicate the required tasks and their performance levels and standards.

**Non-strategic Facilities Management**

This type of FM does not adopt value management approaches in its operations. The activities tend to be largely operational, rather than strategic in nature. The operations are not guided by strategic facilities policies and tend to be reactive rather than proactive.

**Effectiveness of Facilities Management**

This is the extent to which FM service in an office building is able to make the facilities of an organization support the objectives and strategic aims of an organization. It is a measure of how strategic and proactive the FM is. It is also how adequate it is at identifying the needs of the users and its ability to put in place proper provisions to satisfy such needs and hence enhance their productivity. Effective facilities management provides a safe, comfortable and productive working environment.

**Building Performance**

The performance of building as a physical asset is the technical performance of its physical components and the quality of the facilities provided by it. Building performance should be perceived from the level of functionality of the structure, the facilities within it as well as the extent to which it supports activities taking place within it. A building's performance is usually evaluated by rating the performance of its attributes.

**Lagos Metropolis**

Lagos State comprises five (5) administrative divisions i.e. Badagry, Epe, Ikeja, Ikorodu and Lagos Island. Two of these divisions (Ikeja and Lagos Island) are further sub-divided into 16 local government areas that constitute metropolitan Lagos. In other word, 16 out of the 20 local government areas in the state make up Lagos metropolis. The four (4) local government areas that are beyond Lagos metropolis are Badagry, Epe, Ibeji-Lekki and Ikorodu local government areas (Lagos State Government 2011).

## 1.10 ASSUMPTIONS

It is necessary to state some of the important assumptions that were made in this study and without which this research cannot be put in proper perspective. The first assumption made is that every respondent in the BSS provider category is regarded as a facility manager of some sort. This is because FM having evolved from the traditional BSS practices incorporates aspects and some principles of all other building support practices. This assumption was made in relation to objectives 1, 2, 4 and 5 i.e. identifying important measures of effectiveness of FM, performance of buildings in Lagos metropolis, and establishing the correlation and predictive relationship between effectiveness of FM and building performance. It was particularly necessary in Nigeria in view of the fact that the country's FM practice is limited to the operational level thereby making the impact of the real FM practitioners even less discernible. Therefore, the researcher had to assume that the operators of the office buildings occupied by the respondents are involved with facilities management of some sort whether strategic or not. All respondents (users) in the sample are therefore capable of recognizing the important measures and could rate the level of effectiveness of FM services in the buildings they occupy as well as the performance of the buildings.

However, to achieve the purpose of objective 3 this research required a separation between the practitioners of strategic FM and practitioners who do not. This is because the intention is to measure the effect of strategic FM which in the real sense is actual FM. In view of this, only BSS providers who adopt strategic FM principles were included in the strategic FM category. Others were classified in the non- strategic FM category. The value of strategic FM was then measured from the difference in performance between the buildings managed by the practitioners in each of these two categories.

## 1.11 THE STRUCTURE OF THE THESIS

This thesis consists of five chapters organized as follows;

Chapter One is the introductory chapter. It presents a background to the study, statement of the research problem, aim and objectives and significance of the study. It also presents the scope and delimitation of the research, its limitations and the operational definitions of some important terms. Chapter Two is divided into four (4) major sections. The first section presents an introduction to the chapter. The second section reviews related literature on relevant concepts and the historical development and scope of FM. This section also examines topics such as the competencies of FM, the essence of building performance measurement, effectiveness of FM as well as the relevant measures of these two constructs. Lastly, the section examines the strengths and weaknesses of existing performance measurement tools in the Nigerian context. The third section reviews literature on past empirical and published studies in preparation to identifying the gaps in knowledge that this study attempts to fill. The fourth section (last) presents the important theories and models that guided the development of the conceptual framework. It also presents the conceptual framework that the researcher adopts in accomplishing this study.

Chapter three dealt with the method that was adopted in this research. Areas that it covers include research design, study area, population, sample size and sampling technique. It also presents the data collection procedure, questionnaire design, data analysis methods, reliability and validity tests and an insight into the pilot study that was done in this research.

Chapter four is on the analysis and presentation of results and closes with a discussion of the findings. Chapter five presents the conclusions made from the study. In addition it offers recommendations, a summary of the contributions that this study has made to knowledge and suggestions for further studies.

# CHAPTER TWO

# REVIEW OF LITERATURE

## 2.1 INTRODUCTION

This section reviews literature that are relevant to facilities management, its origin and scope. It equally examines ways in which application of FM principles adds value to the operation of businesses through improved building performance and how this aids the attainment of company strategic objectives. It examines previous theories that are relevant to the research objectives particularly those that have been developed for assessing the effectiveness of FM service and building performance. This is with a view to adopt and create operationalisable variables that will be appropriate for the empirical investigations in this study. The review is also aimed at identifying the research gap that exists in facilities management discipline generally and in the effectiveness of facilities managers and office building performance in particular.

The literature review is divided in four (4) main parts. The first part is the introduction while the second part examines terminologies and concepts that are relevant to the study and provides a framework for facilitating a good understanding of the subject. The third sections places the work in the context of previous works of other authors and provides a critical review of previous studies on related aspects of this research such as facilities management and performance measurements. Part four examines the various theories that guided the development of the conceptual framework that was used by the researcher.

According to Bell (1999) and Redestam and Newton (2001), a literature review must contain background materials which are usually not treated to details. The other contents are

foreground materials, which are the ones to be critiqued and medium short materials which are midway between the earlier two. Literature in this group is usually more detailed than the first category and contains descriptive materials on relevant issues. The fourth set is the close up, which are narrow topics that are central to the research. They require careful examination and usually provide a guide on the method which is appropriate for the research.

## 2. 2 UNDERLYING CONCEPTS

This section contains descriptive and introduction materials that have direct relevance to the research. It combines the background, midway and close up categories of materials as explained above.

### 2.2.1 Facilities Management

Researchers such as Payne (2002), Fielder (2004) and IFMA (2006) have defined FM variously. It is necessary to examine the various definitions of FM as presented by these numerous authors in their attempt to develop a contemporary definition for it. Spedding and Holmes (1994) defined FM primarily as managing properties in the best interest of the core business. This definition focuses on the role of FM in the management of properties and the impact of this on the core business. Olomolaiye, Liyanage, Egbu, and Kashiwagi (2004) described FM similarly as a service which provides a conducive environment for the achievement of core business objectives, thereby enhancing the opportunities for their achievement. This definition emphasizes the impact of FM on organizational efficiency and also recognizes it as a service. IFMA (2006) defines FM as a multiple discipline that ensures functionality of the built environment by integrating people, place and technology. This definition similarly focused on the impact of FM on the functionality of the environment but

additionally recognized its special role in integrating technology used in improving buildings' functionality, with the environment and need of the users. This emphasis on the need of users reflects evolutionary developments in FM and is one of the major factors that distinguish it from other traditional property professions from which it evolved.

There are other authors who focused on the impact of FM on organizational performance and its supportive role. One of this is the definition provided in the newly established European Standards (EN 15221.1), as the integration of processes within an organization to maintain and develop the agreed services which support and improve the effectiveness of its primary activities (Wiggins, 2010). Similarly, Chotipanich (2004) defines FM as a key function in managing support services and the working environment in order to support the core business of the organizations both in the short-run and long-run. This definition identifies the operational and strategic nature of FM in the long and short term respectively.

Fielder (2004) not only recognizes the impact of FM on people and the workplace in his definition but also recognizes its multidisciplinary nature. It described it as the integration of multi-disciplinary activities within the built environment and the management of their impact upon people and the workplace. Amaratunga *et al.* (2000) equally recognizes the impact of FM on achieving efficiency of space but emphasizes the ability to do so at optimal cost. The authors explained that the aim of FM is not only to optimize the cost of building but equally to improve efficiency of the management of space and other assets for people and process so that the aim of the organization can be achieved at optimal cost. All these definitions recognize FM as a business practice, a service that integrates and optimizes people, assets, process and the work environment in a way that supports the attainment/delivery of an organization's business

and or strategic objectives, they are however varied enough to reflect the different contexts in which the authors present their definition.

Some other authors in their definition focused on identifying the various roles played by FM in businesses. For instance, Becker (1990) states that FM is responsible for planning, designing and managing of buildings as well as their systems, equipment and furniture in order to enhance an organization's ability to compete successfully. In this definition the ability of FM to enhance organizational competitiveness was emphasized in addition to the identified roles. Similarly, Barrett (1995) focused more on the responsibilities of FM in his description of it as an integrated approach to maintaining, improving and adapting the buildings of an organization in order to create an environment that supports its primary objectives.

Balch (1994) itemises the various tasks of FM. It defined it as provision of communication, office furniture, equipment etc. and tasks for the maintenance of the building itself such as cleaning, lighting, machinery, equipment, building fabric and redecoration. The interest of Nutt (2004) is on the list of items managed under FM. Interestingly this list contains an unusual item - infrastructure. Nutt defined FM as the management of infrastructure, resources and services to support and sustain the operational strategy of an organization over time. In a similar manner to Nutt (2004), IFMA's (2006) definition focuses on items being managed under FM but in addition emphasized its operational and strategic nature. It asserts that FM involves the coordination of the strategic and operational management of facilities (which may include fixed assets and support services) in any organization. Familoni (2005) defines it as not just the management of assets like buildings and the maintenance process, but also as the embracing of all activities within a corporate body outside the mainstream of the firm. By

referring to FM as a support service, this definition emphasized the non-core but supportive role of FM within the organization rather than implying it as most other definitions did. BIFM (2006) listed the services that excellent facilities management can provide amongst others. Top on this list is the effective management of an organization's assets, one of which is buildings. It concluded that only those organizations that approach FM as an integral part of their strategic plan will be successful in future, while those who treat it as a "commodity overhead" will be at a significant strategic disadvantage. It is apparent from these arguments that FM will improve the performance of buildings and the working environments and processes in an organization, thereby minimizing operational costs and maximizing profits of businesses. According to Wiggins (2010), FM functions can be clustered into three categories as they relate to premises, information technology and support and these functions can be provided either at the operational, tactical or strategic levels.

Payne (2002) provided a more pragmatic definition that describes FM as the glue that holds organizations together in a way that enables it provide its output in a seamless manner within a conducive environment. While not explaining how it works as a glue this definition enables the reader to visualize the proactive nature of FM and to understand that as in a seamless gown the processes of an efficient FM should not be seen, only the impact in the form of a neat, conducive and effective working environment should be felt. The definition by Donald (1994) is a total deviation from most and examines FM in the wider context as pertaining to its impact on organizational psychology. It sees the role of FM as being that of a facilitator of cultural change within an organization. This definition seems rather farfetched particular in the context in which most FM functions operate.

The different definitions of FM as discussed above supports the assertion that there is no exact definition for the term FM and that its meaning vary from one nation to the other with the level of development of the profession. It also varies with organizational characteristics and facilities, the market, social environment, local culture and context and how strategic its role is within each organization (These notions are supported by both Tuomela and Puhto (2001) and Chotipanich (2004). It is however established that FM transcends the maintenance and management of the assets of an organization. It is a support service that impacts on people through its effect on the built environment. This researcher agrees with Grimshaw (1999) that these different definitions of FM should not been seen as a weakness, as rather it epitomizes the newness of the area of practice as well and the change which is inherent in FM itself. He explained that as a market driven practice FM must relate to its environment which is continuously changing. This implies that the different definitions of FM offered by the various authors are sometimes reflective of the profession's attempt to develop in response to the evolving needs of the users. It also implies that even in the developed world FM has metamorphosed but was likely to have been inclined towards operational activities at its infancy stage.

Grimshaw (1999) further states that what is important is recognizing the relevant aspects of these definitions and the validity of the different opinions as shaped by context. This suggests the need to develop a definition for FM that will be contextual to this research: that is a working definition. Taking a cue from the definitions of these various authors, the definition of FM that this research adopts attempts to take cognizance of the trusts from which the various writers examines the terminology such as the supportive role of the profession, the need for it to be effective and efficient; in other words the consideration for cost minimization,

optimization of return, as well as the need to achieve the primary objective of the respective organization. In view of these, the working definition of FM for this study is the application of management process to the planning, provision, efficient upkeep and control of organizational facilities and the operation of effective support services towards optimal achievement of organizations' set objectives at minimal cost. Broadly, FM in this study will involve planning for facility i.e. space/building, equipment, furniture, fittings, plant and machinery and support service requirements within the buildings as well their provision and effective management with a view to making them efficient and supportive to the achievements of the goals of the organization.

### 2.2.2 Historical Development of Facilities Management

There are conflicting views on the novelty of FM as a profession. Writers such as Alan (1998) cited in Wiggins (2010) suggested that FM is not as new as it is being presented and that what is new is the current corporate appreciation of the profession. However, this corporate presentation has provided the required opportunity for an all-embracing professional to be in charge of harnessing complementary functions required in an efficient management of the work space. Spedding (1999) explains that the newness of FM is in view of the support it enables property to give to the objectives of a particular business.

FM is said to evolve from some other traditional property management professions. This is probably why in some markets there are still no clear distinctions between the practice of FM and the more traditional real estate professions such as property management, asset management and maintenance management. Gilleard and Yiqun (1999) made similar conclusions about the Shangai market and Ho, Chan, Wong and Chan (2000) said the same

about Pacific Asia's market. Price and Aklaghi (1999) in a similar vein explained that FM started as building management and evolved to a profession that integrates people, process and place in its second generation. He went further to say that in its third generation FM is likely to be creating spaces which enable different levels and form of performance. Akintunde (2009) explained that in Nigeria, the FM practice is not discernible from the traditional BSS practices it evolved from, while in an empirical study Koleoso, Adewunmi and Adejumo (2012) found that FM is used largely as a catch phrase for marketing and does not offer much of the strategic roles that are important for FM.

Authors such as Lunn, Price, and Stephenson (2002) and BIFM (2006) do not regard FM as a totally new profession. According to Lunn *et al*. (2002), FM originated in the United States of America (USA) in the 1960's where the term was used to describe the growing practice of banks outsourcing responsibility for processing of credit card to specialist providers. In 1978, Herman Miller a furniture manufacturer convened a meeting in Michigan to discuss developing trends in office design and termed this facilities management. The participants of this convention formed the International Facilities Managers Association (IFMA). From the USA it first moved to Australia and then United Kingdom (UK) and from here to other parts of the world. Similarly Owen (1995) explained that FM originated in the world of information technology and later became transposed into the built environment through office designs and furniture manufacturing.

Although there are divergent views on the novelty of FM, most authors agree with the view of Lunn *et al.* (2000) that FM in its present form, originated from the USA as a response to the need for a more contemporary office administration. According to Price and Aklaghi (1999)

FM started as a response to growing need to increase value from white collar services; that is support services. This can be achieved by reducing cost base and increasing value from service and knowledge based enterprise. Haynes and Price (2002) opined that FM was coined in America during the late 1970's to describe a developing field of study into design and management of workplaces and their impact on the business of organizations that occupy them. According to Wiggins (2010) FM can be traced to the era of scientific management and explosion of office management of the 1990's which in itself is a result of the introduction of computers in the 1960's and the energy crises in the 1970's. She explained that the term facilities management was coined by Perot in USA in the 1960's and that at that time it was associated with trend in IT systems and quickly grew to include modular furniture and office design which at this time was being developed by Herman Miller as mentioned earlier. In view of the fact that these modular furniture were ahead of their time Miller brought together property users and advisers to bring strategic planning into office management. With the aim of establishing FM as a management science offering professional activities this group established itself as the facilities management Institute (FMI) in Michigan USA in 1979 with David Armstrong as the unofficial leader. FMI evolved to National Facilities Management Association (NFMA) in 1980 and later to IFMA the same year.

Carlsson (2002) stated that there are two variations in the nomenclature of the FM practice and that while it is referred to as Facility management in the US it is known as Facilities management in the UK. Haynes and Price (2002) believes that by the time FM got to the UK it became known as Facilities Management and that the original sense of workplace design became confused with the provision of building support services particularly where such services are outsourced. This researcher disagrees with Haynes and Price (2002) that the

difference in perception of the role of FM from US to UK is a result of confusion. Rather it is due to evolution. It appears that by the time the profession would move from US to UK it has evolved in response to the requirements of the users. Such changes are inherent in FM as a profession, as the need and context of the users change. This assertion is supported by Price and Aklaghi (1999) in their work which explained that FM has evolved through two generations with slightly modified roles and is expected to advance to a third. It appears that while FM could be to be said to be in the third generation stage in most of the developed world where it emanated from, it is still at the first or second stages within most other markets.

It is presumed that some factors have naturally led to the evolution of FM. Some of these include, cost cutting initiatives of the 1970s and 1980s under which companies started to adopt outsourcing particularly for their non-core services. This was followed by the formation of the British Institute of Facilities Management (BIFM) in 1993 (BIFM, 2006) and then step change with Private Finance Initiative (PFI) now known as the Public Private Partnership (PPP); becoming an integral part of large scale government project in some part of the advanced world particularly in the UK. PPP that involves the facilities managers are now used whenever there is a need to replace, upgrade as well as manage the country's infrastructures and service facilities.

The Facilities Management (FM) Industry has experienced rapid growth across the globe, in the last couple of years. Market research suggests that in the UK alone the sector is worth around £96 billion (17.760 trillion naira) per annum (BIFM, 2006) and is the fifth largest service industry in the economy (Fielder, 2003). Similar rapid growth obtains in Nigeria in spite of the infancy of the practice. This growth is driven by the need for better company

performance particularly in the face of globalization, new technology applications and complex organizational needs.

The FM sector which originated between 30 – 40 years ago in the US and about 25 years in the UK (Drion *et al*., 2010), has developed today into a large and complex mix of in-house providers, specialist contractors who provide specific services as may be required by the client organization or large multi-service companies and consortia that can provide a wide range of services. The membership of FM as a profession is growing gradually. As at 2004 BIFM had a head count of 8,200 members, 240 of whom are corporate members while RICS had over 7,000 members (BIFM, 2004). As at 2009 IFMA had approximately 19,500 members in 60 countries, including Nigeria, while members of Euro FM represent about 75 organizations across at least 15 countries (Wiggins, 2010).

Facilities management practice is equally gaining recognition in Nigeria in spite of its infancy (Ojo, 2002 and Adewunmi *et al*., 2008). The national chapter of The International Facility Management Association (IFMA) is already established and has two branches, one in Lagos and the other in Abuja. This association which is populated by different professionals offers guidance and expertise to their members as well as undertake researches to substantiate best (FM) practice. The Nigerian IFMA made up of about 1000 members attempts to associate Facilities managers and affiliates into an organized profession. Other responsibilities that it performs include assisting members in acquiring knowledge and recognition and improving standards of practice, fostering high professional ethics, introducing and presiding over certification standards. Its objectives are to be the national authority on facilities management, providing opportunities for professional development and providing a forum for exchange of

ideas and experiences for the advancement of a career in Facility Management through seminars, conferences and workshop (Fatoki, 1998). The association promotes the image of the profession within the country and also sponsors educational programs in FM and related subject matter particularly in collaboration with national and international educational institutions handling programs in FM.

The Nigerian Facilities Management practice evolved from property management [Ojo, (2002) and Odiete (1998)] and is gradually gaining grounds within business organizations that are particular about the functionality of their offices, particularly oil companies, banks and international organizations operating within Nigeria. Presently, University of Lagos Akoka runs a post graduate programme in FM at Master's level. Ahmadu Bello University Zaria also runs a PgD in this discipline

### 2.2.3 Scope of Facilities Management

Bottom (2003) stated that there is a plethora of service providers who all advertise themselves as FM providers. The list includes general contractors who moved into FM to take advantage of profit margins; single service providers, such as catering or cleaning contractors who have been encouraged to offer a broader range of services; consultancies that are forced into FM to seek alternative sources of income when consultancy needs of the industry declined with economic downturn and lastly the consortia who provide a total package of FM to organizations. Scope of FM varies from small scale such as that of a school caretaker or janitor; to large scale such as Johnson's control operations of Chrysler manufacturing company (BIFM, 2006) and could have significant impact on the level of performance of

company buildings in terms of derivable user satisfaction and the support that it provides to the core business and invariably the facilities cost/value model.

Zubairu (1999) gave a relatively constricted scope of FM functions. The five major areas considered included premises operations, space management, real estate, project management and office services. These perceptions of the scope emphasize the technical and operational scope of FM rather than its strategic and invariably management scope. Nutt (2000) in examining the scope of FM gave a list that includes procurement and management of support services such as security, cleaning, catering, and architectural consultancy. This perception focuses on operational responsibilities of FM but also includes the workplace design scope which according to Hinks and McNay (1999) was where FM actually evolved from. The scope of responsibilities of a typical male FM professional in the UK as provided by Oldham (2004) is closer to that of Nutt (2000) but different from that of Zubairu (1999) in that it is wider and more a list of activities than categories. The list include repairs and maintenance, machines and equipment, cleaning, health and safety, space planning and relocations, security, reception, conferencing and hospitality, grounds maintenance and catering.

According to Barret and Baldry (2003) the scope of FM includes, facility planning, building operations and maintenance, real estate and building construction and general office services. This list includes both operational and strategic activities of FM. Nutt's (2004) list of FM activities comprise management of the workplace, facility, support services, property management, corporate real estate and infrastructure. This list is wider than the writer's previous list and appears to be an attempt at providing a more contemporary list of scope of

activities for FM probably to reflect the evolving nature of the practice. It includes more recent scope such as corporate real estate and infrastructure management

A survey conducted by BIFM in 2004 identified frequently performed tasks in the scope of FM as including cleaning and waste recycling management, machine and engine maintenance and building maintenance. Services that are less frequently provided include financial services, human resource services, information technology, financial and business analysis. According to this survey other aspects of the practice that people were involved with include ground maintenance and landscaping, pest control, business continuity and risk management, conference and event management, photocopying and printing, space letting and insurance (BIFM, 2004). Not all of the scope of FM that was covered in the survey is listed herein, however from this list there is sufficient indication that most of the services that are being offered are operational in nature. IFMA (2006) gave an all-encompassing list of 41 activities under eight headings of real estate, planning, budgeting, space management, interior planning, interior installation, architecture and engineering services, building operations and maintenance. The elaborate nature of this list reflects the special place of IFMA as custodians of knowledge of FM practice. It reflects most of the operational, design, ergonomic and technical roles of FM as well the strategic roles for which FM prides itself. According to Anderson (2010) the scope of FM includes more strategic activities such as safety, logistic support, cost control and service level monitoring. Similarly, Wiggins (2010) identified the scope of strategic FM to include, locational preferences, property management, space management, quality management, image and culture management and information technology services

In addition to Zubairu (1999) other Nigerian authors have also examined the scope of FM. For example Odiete (1998) asserted that the scope of FM includes real estate, project management, space management, premises operation and office services, while Sanni (1998) gave a similar but slightly longer list of the scope of FM as; property management, strategic facilities management, capital budgeting, space planning and management, new construction and renovation, architectural and engineering services and audit and analysis of facilities and management. Akintunde (2009) gave a scope that borders only on projects that are undertaken in buildings. His list includes, design, procurement, construction, installation, commissioning, operation and maintenance of such projects. It appears these authors were expressing the scope of FM as recognised by them as practitioners in the Nigerian context. However, it is generally accepted that strategic FM is not common place in Nigeria (Akintunde, 2009 and Koleoso *et al*., 2012).

The various lists provided by the different authors imply that the scope of FM like its definition changes with organizational requirements and for it to be effective each organization must define a suitable scope for its FM. Facilities management as a practice integrates asset management and all aspects of business management of an organization that is not the core business. Hence the scope of FM that this research adopts includes space planning, acquisition and management; procurement of required material, space, staff and other resources; asset maintenance; management and coordination of organizational processes; maintenance of sanitary conditions, security and health within buildings; communication and transport; financial planning; aesthetics, public relations and company reputation, catering and hospitality.

BIFM (2004) made a very important finding in one of its surveys that sometimes those who perform FM responsibilities in organizations are not given the title of facilities manager. Hence they are not aware that they are performing this role and so cannot avail themselves of the support service that are available to them as professionals. It appears that this situation could equally be applicable to Nigeria where employees in Human Resource or similar departments could be performing FM function. The implication is that such organizations claim that they do not have facilities managers but the reality is that the person performing these roles is not bearing the appropriate title.

### 2.2.4 Factors which Determine the Scope of FM

In their works, authors such as Simpson and Barrett (1996), Aklaghi and Price (1999), Teicholz (2003), Barret and Baldry (2003) and Chotipanich (2004), attempted to identify the various determinants of the scope of FM. Accordingly, Simpson and Barrett (1996) identified four major factors as follows; Organizational structure, the role of the provider, the level to which services are contracted out or outsourced and how well the company's FM department has performed previously. For example, where the facility manager holds a directorship role, FM is usually more strategic; alternatively, if he is low in the organizational hierarchy, his role is usually less proactive. An active FM department is likely to have a broader range of service provision and input into strategic decisions, while a poorly performing one may have a narrow and limited scope. Similarly, the greater the level of outsourcing, the more likely it is to stimulate changes in the scope and role of FM. According to Teicholz (2003) these determinants include among others the size of an organization and its ownership structure, i.e. whether the company is publicly or privately owned and whether the facilities comprise of single or multiple buildings, are leased or owned, centralised or distributed. The focus in

Simpson and Barret (1996) lied in behavioural issues and the nature of human resources, while that of Teicholz (2003) was more on ownership structure and physical nature of the facilities within which FM is functioning. In the works of Wong (2000) the focus was on FM standard and national culture. The research gave example of the tolerance level of the Asian culture when compared to UK, and how this lowers the performance standards with respect to user expectation and hence affects the scope of the FM's job. Chotipanich's (2004) list of the determinants of FM scope included nature and characteristics of organization, business culture, business objective and environment, economic and social environment, legislation and regulation, FM market, local culture and context. This list is quite extensive and like that of Simpson and Barret (1996) focuses on internal factors that are behavioural in nature but also includes strategic factors such as business objective. In addition this list unlike most others considered factors that are external to the organization and its facilities such as regulation, environment and culture. This researcher supports the assertion by Chotipanich (2004) that factors such as legislation and regulation, FM market, environment and local culture are important determinants of the scope of FM, particularly as it pertains to the Nigerian FM contexts but prefers to include in this list additional factors that are equally important in determining the extent of FM coverage such as the period or date when the FM contract is procured, the extent of outsourcing of FM service by the organisation and or FM contractor and the aim which the FM providers set out to achieve.

In conclusion, the scope of FM varies significantly with internal contexts of an organization such as characteristics, size, organizational culture and business objective. Others are status of the FM providers within the organizational hierarchy and external factors such as local culture, FM market and economic situation. Therefore, the first rule of the scope of FM in an

organisation is to ensure that there is a formal definition of the scope of responsibilities and those definitions must be agreed to by senior management (Anderson, 2010). Furthermore, each market and invariably each nation must discern for itself a scope that can be generalised, from which each practice or organization can structure its individual scope as influenced by the within organization context and influences.

### 2.2.5 Competencies, Skills and Disciplines in FM

Facilities management is a diverse profession and is a reflection of membership arising from human resources, engineering and administrative background. Inadvertently, several definitions for FM reflect this multidisciplinary nature. Zubairu (1999) identified disciplines that FM functions spans across as including engineering, building, building services, architecture, real estate, systems engineering, information systems management, human resource management, environmental psychology, interior design and space planning. Some other disciplines identified by Hammer (1988) cited in Iyagba (2005) include, energy planning and security engineering, fire, health and safety engineering, design and construction engineering and environmental science. IFMA (2006) listed among others business administration, architecture, behavioural and engineering services. This suggests that the FM profession can emanate from a technical or from a management background but the most essential factors in a facility manager's ability to perform are the skills and competencies that the professional has been able to acquire and the resources that are available to him.

To be efficient a facilities manager must acquire competencies and skills that must cut across both the technical and management divide. Pickard (2004) puts the importance of obtaining the management skill to an FM practitioner succinctly in his research titled putting the "M in

facilities management". He explained that though FM training seems to be dominated by the technical aspect, the management skill is one factor that can make all the difference to the success of the facilities manager. He went on to emphasise the importance of such management skills as communication; particularly ability to listen and ability to deliver a powerful presentation. This research agrees with Pickard (2006) that neither the technical nor the management competence is more important and that asking which is more important is like asking whether it is the male or the female sex that is more important for progeny. Anderson (1994) cited in Familoni (2005) took this a step further when he suggested that for companies to prosper in the coming decades professionals in FM will need to employ in addition to the two skills identified earlier intuition and analytical competencies.

Clark and Hinxman (1999) noted that one peculiarity of the FM profession regarding competencies is the fact that it is one profession where there are no standard prerequisite qualifications. For this reason they decided to carry out a research into competencies in the profession using previous research that had been sponsored by companies as case studies. Their aim was to recommend a kind of guide on what educational institutions should aim to provide as basic competencies to prospective practitioners of FM. They concluded that a typical FM programme should include the basic BIFM competencies which should include the following;

- Understanding of environmental issues
- Insight into building design
- Knowledge of relevant legislation
- Project management skills
- Research survey and analysis skills

- Management of FM processes
- Property portfolio management
- Risk management
- Marketing
- Stress management
- Coaching/monitoring
- Managing conflict
- Managing time deadlines

This researcher agrees that all the above competencies are very important for FM but she is of the opinion that it is equally important for the facilities manager to acquire in addition other competencies such as asset/property maintenance, management of contract agreements and financial management and, in the Nigerian context, response to crises or crises management, as the socio-economic situation in the country seems to predispose facilities to crises situations.

### 2.2.6 Attributes of a Good Facilities Manager

Important qualities of a good facilities manager according to Amaratunga and Baldry (2002) included a good understanding of the strategic objectives of the client organization and ability to pre-empt and translate the needs of the client organization into facilities strategies which underpin such operational objectives that will yield competitive advantage. Others are the ability to recognize shareholders' needs and the corporate culture and creativity of the people. Teicholz (2003) added attributes such as ability to identify situations in which additional information is required and where to get it, willingness to learn, motivation, flexibility and persuasiveness. Some no less important attributes are ability to act as the advocate of his

department, good communication and interpersonal skills, good time management, multi-tasking skills and ability to understand and accept diversity. Another important attribute of the facilities manager is ability to generate and appropriately utilise feedback, which can be obtained through interactions between the FM unit and the functional and core business units benchmarking, of internal FM services against those of other organizations. Others are interaction with core business units to identify required future changes to the business and interaction between strategic and operational FM to achieve a balance between current operations and future needs. Rogers (2003) identified some further attributes of Facilities mangers as having a trait of outstanding leadership, clarity of purpose, good procurement and vendor management skills and general business management skills. They must also possess, technical skills, problem solving and decision making skills. Some other behavioural attributes that the facilities manager should have are confidence, kindness, respect and trust (French, 2010).

### 2.2.7 Role of FM in an Organization

To meet the challenges that businesses are facing in this age firms need efficient and productive work environment with physical, functional and financial flexibility. A proactive facilities management department must therefore be able to meet these requirements. One of the primary roles of a facilities manager in an organization is that of cost savings. Invariably he will have a schedule of responsibilities that will revolve around this. Familoni (2005) listed ten (10) of such responsibilities as including;

- Effective management of all costs related to procurement and maintenance of the firm's facilities
- Planning, coordination and implementation of all property related capital project

- Supervision and maintenance of accurate fixed assets records
- Ensuring adequate insurance cover for the firms' assets
- Maintenance of all properties in compliance with laws and industrial standards
- Monitoring and control of property and maintenance expenditure
- Preparation, monitoring and control of maintenance contracts
- Implementation of company policy on property acquisition, development leases, development and maintenance
- Assisting in preparation of annual operating budget
- Organizing the fixing and collection of rent and professional preparation and execution of rent agreement.

It should be understood that this list is not exhaustive and there are other responsibilities in the FM schedule that revolve around cost savings that are not in this list.

Lindholm and Levainen (2006) provided a summary of seven key areas through which the corporate real estate/facility manager adds value to business organizations as; increasing the value of assets, promoting marketing and sales, increasing innovation, increasing employee satisfaction, increasing productivity, increasing flexibility and reducing cost. An additional role that FM plays which, distinguishes it from both asset and business management is the business support role. The facility manager does not only implement company policy on property issues but advises and works closely with policy makers on property decisions as this is one of his areas of specialization. This line of argument was supported by Nutt (2000) who stated that the objective of FM at the national level is to make available infrastructure and logistic support to businesses and the public and at the local level to manage facilities effectively in order to provide support to organizations in their operation. He further stated that

this support impacts on finance, asset value, operational cost, human issues, use, environment, security, safety, health, space, structure, technology and maintenance.

Another important factor when examining the role of FM in organizations is that it is in the strategic rather that the operational roles that the strength of FM lies and this was probably the reason why (Becker, 1990, p 8) in his writings concluded that, " *facility management is not in the business of such things as wire management, space planning, furniture selection, building maintenance, or lease negotiation per se. strategic policy and procedure governing planning processes and resource allocation are (or should be) central themes in facilities management"* FM has two complimentary objectives: that of reducing the risks and constraints that properties impose on organizations and its workers and promoting the positives that the property might provide. This is why researchers hypothesize that if FM is effective then building performance will be enhanced (Nutt, 2000).

Another major role of FM is creating or sustaining good company image. According to Pickard (2006) this is a major area through which a facilities manager can demonstrate real contribution to the organization. Modern day communication gadgets have so much impact that an organization may find it difficult to survive a negative publicity of any type. An effective FM will proactively manage all issues and ensure that the organization is not involved with any scandalous issues.

### 2.2.8 The Rationale for Buildings/Facilities Performance Measurements

This topic examines the numerous benefits that are derivable from measuring the performance of buildings and their management by the building industry, according to literature. In other

words, it examines both the benefits of building performance measurement and measurement of performance of facility managers.

In today's terms the fate of organizations are increasingly governed by volatility in business practices, user requirement and lifestyle (Leeman and Bordass, 2001). Performance evaluation help managers of building to cope better with these volatilities so that businesses and national economies are better sustained. It has been found that good outcomes from properties sometime emanates from minimizing the downsides rather than optimising its potential benefits (Bordas, Leaman and Ruyssevelt, 2001). Performance measurement helps to indicate these downsides and simple ways of achieving things with minimal efforts. The presence of symptoms of underperformance in a building is sometimes an indication that its management is overburdened by the support requirements of the building. These requirements can overburden management where there is poor communication between the parties and where there are false expectations on the part of the occupier. Overburden could also result where designer's fail to convey adequate information on the level of support that a building will need (Bordas, Leaman and Ruyssevelt, 2001). Performance measurement therefore helps to identify the presence of a burdensome building support system in order to forestall its continuous existence and repetition in future. Environmental sustainability legislations are becoming extensive and the implications of not abiding by them are becoming increasingly severe. Performance measurement helps building and its service providers to identify these legislative requirements and to adequately meet them (Leaman and Bordass, 2001).

Performance measurement helps provide information on the current level of performance in a building, how well a building has met its objectives and suggests possible rooms for

improvement. This is captioned succinctly in the statement made by Teicholz's (2003) that you cannot improve what you cannot measure. Performance evaluation indicates the need for resource re-allocation, thereby improving efficiency in its allocation. These help to improve the performance of both proposed and existing buildings and invariably that of the occupants. As a consequence, the cost-benefit ratio of both buildings and the human resources that occupy them are enhanced. Performance measurement also helps to enshrine accountability on the use the funds and resources of organisations.

Performance evaluation helps to identify customer needs and increase the level of their satisfaction thereby making buildings more customers friendly. It helps to bridge the gap that persists between the expectations of building users and the quality of services provided by practitioners towards the fulfilment of these expectations (Augenbroe and Park, 2005). Buildings and facilities sometimes undergo drastic changes which could require a redefinition of their internal client processes in response to refurbishments, internal reorganizations, and or change of building occupants (Augenbroe and Park, 2005). In instances like these, performance measurement helps to ensure that the building continues to meet users' needs.

Performance measurement demonstrates the value of FM to businesses, thereby enabling the practitioners attain strategic roles in organizations (Nelson, 2006). It provides the essential information that is required in the monitoring and control of the building delivery process thereby improving the performance of the industry and its product. The thinking of the construction industry professionals are fragmented as a result of the significant fragmentation among them (Alexander, 2008). User's perceptions on the other hand are not; because building performance evaluation adopts user perception it create solutions to problems in the work

environment from the perspectives of the user rather than as dictated by the fragmented structure and thinking of professionals within the industry. This helps to streamline and improve the focus of these solutions to the problems of the work environment.

### 2.2.9 Assessment of Performance

The added value of FM to organization comprises both the tangible and the intangibles (Nelson 2005). The bane of majority of the existing performance measurement tools is the inability to adequately quantify the values of the intangible benefits or components, which ordinarily do not have numerical values. An appropriate measurement tool for FM efficiency and building performance must therefore be capable of demonstrating how FM provides comfort and satisfaction to users; It must measure from the financial, building condition, service and customer perspectives.

Performance measurement incorporating non-financial measures have been found to be capable of overcoming the limitations of the financial measures. For this reason they have become topic of great interest particularly in the 1990's. However, this has not always been the case and at one time traditional measures of FM performance which focused on costs were quite popular (Nelson 2004). Financial performance measures, concentrate on the contribution of FM from the angle of operational efficiency and cost. It perceives property as a cost that needs to be controlled, instead of an asset that creates added value to the business. As a consequence, FM performance is measured using units such as cost of space occupied per head, total cost of facilities per square meter, maintenance cost per square meter etc. Another important characteristic of the traditional performance measurement system is that it failed to

provide managers with the information that they needed to measure and manage the all-important FM competencies that drive competitive advantage (Amaratunga et al, 2000).

### 2.2.10 Effective Facilities Management

Newing (1995) noted that effective facilities management must pay attention to issues of employee commitment, customer satisfaction, risk process and organizational control. Other indicators of effectiveness according to Barret (1992) and Amaratunga et al. (2000) are process performance, managerial behaviour and product or service innovation. Heywood et al. (2004) opined that facilities performance management centres on an overlap of creating a productive workplace, maintaining/developing facilities and planning/management of facilities. They examined the effectiveness of FM from four perspectives as follows:

- Performance of buildings as a physical asset
- Functional performance i.e. as support to occupiers
- Support for the business and
- Service delivery

BIFM (2006) provided a more detailed list of services that effective facilities management can provide amongst others. This list includes;

- Effective management of an organization's assets
- Enhancing the skills of people within the FM sector and provision of identifiable and meaningful career options
- Enabling new working styles and processes that is vital in today's technology driven age
- Enhancing and projecting an organization's identity and image and thereby enhancing patronage

- Helping the integration processes associated with change, post-merger or acquisition,
- Facilitating continuity of businesses and workforce protection in an era of heightened insecurity threats (This is applicable to current situations of Nigerian businesses with the prominence of conflicts and unrests).

BIFM (2006) concluded that only those organizations that approach FM as an integral part of their strategic plan will be successful in future, while those who treat it as a "commodity overhead" will be at a significant strategic disadvantage. The emphasis of this study will be on the first aspect i.e. effective management of an organization's asset towards the achievement of company strategic objective, although it is recognised that there might be some overlap between this aspect and some of the others.

### 2.2.11 Relationship between Effective Facilities Management, Efficient Buildings and Company Performance

The relationship between a performing building or work environment and company productivity has been established by writers such as Spedding and Holmes (1994), Oseland and Bartlet (1999), Amaratunga *et al.* (2000), Olomolaiye *et al.* (2004) and Fielder (2004). It is therefore important for companies to try to establish office buildings with high level of performance so that their productivity and profitability would be enhanced.

Facilities and their upkeep generically constitute a significant proportion of the turnover of businesses (Bottom, 2003). It can therefore be presumed that its effective management can reduce both the nominal and real cost of this balance sheet item, thereby enhancing cost savings and profitability of well-established and ailing business organizations all over the country. Invariably, effective FM could improve the nation's economy through improved

efficiency of the organizational processes, enhanced patronage, improved profits which translates to the protection of business/continuity and lastly, provision of jobs and widened career options for the populace. Veale (1989) provides that an average corporation's total occupancy cost represents about 40 – 50% of net income. This signifies that organizations can easily enhance profit by controlling occupancy cost through FM. Apart from reducing cost of occupancy; enhanced capacity utilization and life span of the asset are some other ways that FM can enhance profitability.

The long term cost of operating any building and the value of the contribution it makes to the operations of the business of the organization occupying it is usually quite significant. This is why any organizational process such as FM that is capable of minimizing this cost by promoting efficiency of buildings should be a welcome addition in every organization. One of the major goals of FM is to minimize operating costs of buildings.

Carlsson (2002) and Grimshaw & Keefe in Nelson and Baldry (2000) opined that FM is based on the premise that the efficiency of any organization is linked to the physical environment in which it operates, and that the environment can be improved to enhance efficiency. Nelson and Baldry (2000) therefore concluded that there is a correlation between improving FM process and building performance. This assertion is supported by the relationship drawn by BIFM (2006, pp1) between effective facilities management, an efficient working environment and organizational effectiveness, in its conclusion that "*effective facilities management, combining resources and activities, is vital to the success of any organization. At a corporate level, it contributes to the delivery of strategic and operational objectives, on a day to day*

*level effective facilities management provides a safe and efficient working environment, which is essential to the performance of any business whatever its size and scope".*

It is apparent from these reviews of literature that effective management of facilities will make it possible for company objectives to be achieved by providing a conducive work environment or building which ultimately results in improved work performance, productivity, cost savings and ultimately profitability of the respective organizations. Therefore it can be concluded that these previous studies have established a positive relationship between effective facilities management and building and invariably company performance. This research attempts to determine if this relationship will be corroborated by the data obtained from the sample.

### 2.2.12 Measures of Effectiveness of Facilities Management

Understanding the role of buildings and how they can be deployed in the context of the operation of each individual business is the essence of FM (Kwok and Warren, 2005). A client perspective of FM effectiveness is usually from two angles i.e. technical and functional performance. Technical performance indicates how well the problems are solved and the techniques and equipment used. Functional performance is concerned with how the service is provided i.e. how courteous and responsive the FM staffs are (Barrett, 1995). In organizations the choice of performance measure for use should depend on which of these two quality factors is more important to it. However, a good performance measure will normally combine both aspects though with different emphasis. Simpson and Barrett (1996) advised that the customer' evaluations of service quality could be measured against service level agreements (SLA) but advised that SLA could be a valid scale only where a fair representative of the consumers have been used in developing the service agreement.

Varcoe (1996) opined that the important dimensions of building performance are three i.e. customer satisfaction, functionality and productivity. He discouraged the use of financial measures which he claimed originated to satisfy such external financial reporting as auditing. He discountenanced the idea of using different weighting for the dimensions according to organizational objectives as applicable with the Balanced Score Card (BSC) framework by Kaplan and Norton (1996). This is because according to him it is assumed that the objective of the organization is already reflected in the operational measures. This current study adopts this recommendation and therefore avoided the use of different weightings for the dimensions in this study.

**Table 2.1: Key performance indicators for FM providers**

| |
|---|
| -No loss of business due to failure in premises services |
| -Customer satisfaction |
| -Completion of project to customer satisfaction |
| -Provision of safe environment |
| -Effective utilisation of space |
| -Effectiveness of communication |
| -Reliability |
| -Professional approach of the premises staff |
| -Competence of staff |
| -Management of maintenance |
| -Responsiveness of FM department |
| -Changes and requirements |
| -Value of money |
| -Satisfactory physical working condition |
| - Relevance of equipment provided |
| -Suitability of premises and work environment. |
| -Quality of end product |
| -Effectiveness of FM helpdesk service |
| -achievement of completion deadlines |
| -Correction of faults |
| -Standard of cleaning |
| -Management Information |
| -Energy performance. |

**Source: Hinks and McNay (1999)**

Hinks and McNay (1999) featured important measurement dimensions such as client satisfaction, responsiveness, service reliability, safety, staff performance and cost effectiveness and comprises important individual factors that are measurable. Table 2.1 displays some of the more important measures that were featured in the model and which were adapted and incorporated into the conceptual model for this current study.

Amaratunga *et al.* (2000) and Amaratunga and Baldry (2003) attempted to populate the four dimensions featured in the BSC. The various measure featured under each dimension are presented in Table 2.2 above. A number of these measures were used in this research. Ho *et al.* (2000) adopted eight dimensions of size and use of facility, maintenance, refurbishment, cleaning, energy consumption, ground and environment, safety, security and parking. Most of the measures featured under these dimensions are similar to those in other studies. Brennan, Chugh, and Kline (2002) used a 20 item scale categorized into four (4) dimensions of satisfaction with physical environment, physical stress, relations with team members and perceived performance.

Some of the important measures of FM that were included in the works of Leaman and Bordass (2001) and Pickard (2006) includes, quality of complaint desk or feedback procedure, nature of problem reporting procedures (can it be done online?), quickness of response, how integrated are the problem rectifying attempts, how efficient are response to computer crashes, the amount of downtime, availability of productivity enhancing intervention, effectiveness of maintenance regime and reliability of services. Others are sensitivity of the FM staff, efficiency of security system, and level of absenteeism of FM staff.

**Table 2.2: FM Relevant Strategic Objectives and Measures**

| Perspective | Strategic Objectives | Strategic Measurements |
|---|---|---|
| Financial | F1-Financial growth<br>F2- Cost reduction/productivity improvement<br>F3- Asset utilization<br>F4- Management of working capital | • Cash flow<br>• Cost reduction rate<br>• Unit costs (per unit of output)<br>• Reduce indirect cost<br>• Services sharing with other business unit<br>• Reducing the working capital |
| Customer | C1-Timeliness of service<br>C2- Service quality<br>C3- Range of services offered<br>C4- Effectiveness of partnership, communication and coordination | • Customer satisfaction survey<br>• e.g. Post –occupancy evaluation etc. |
| Internal Processes | I1- Service Excellency-technology capability<br>I2- Understand the customers<br>I3- Employee competence<br>I4- Process efficiency<br>Team work and coordination | • Process management<br>• Service quality survey<br>• Superior project management<br>• Employee satisfaction index<br>• Customer contact surveys<br>• Output/cost ratio<br>• Number of multi-skilled staff |
| Learning and Growth | L1- Technology leadership<br>L2- Continuous service improvement/service innovation<br>L3- Upgrade staff competencies/ staff development | • Time to develop new processes<br>• Staff attitude surveys<br>• Number of employee/customer suggestion<br>• Degree of new facilities /services introduced<br>• Employee satisfaction<br>• Staff development program<br>• Courses completed<br>• Internal promotions made<br>• New business development<br>• Expanding services<br>• Training hours per employee<br>• Independent training courses |

***Source- Amaratunga et al (2000)***

Lindholm and Leväinen (2006) just as in Amaratunga *et al.* (2000) attempted to populate the four dimensions of the BSC to make them more suitable for measuring effectiveness of corporate real estate management and facilities management services.

**Table 2.3: Corporate Real Estate Management and Facilities Management Relevant Measures for BSC**

| | |
|---|---|
| The financial perspective | Financial result<br>Return on assets<br>Value of properties (book-or market-value)<br>Amount of sold properties<br>Vacancy rate<br>Amount of leased properties vs. owned properties<br>Amount of rented properties |
| The business process perspective | Vacancy rate<br>Square feet per employee<br>Occupancy costs<br>Transaction costs<br>Return on assets<br>Gaining the sustainability objectives (amount of waste energy consumption etc.)<br>Effectiveness of projects investments (budgeting, scheduling targets)<br>Business units satisfaction for CREM performance |
| The learning and growth perspective | Professionalism and expertise of CREM staff<br>Competences of the staff<br>Average age<br>Level of education<br>Reward systems and motivation<br>Atmosphere of the community<br>Training and development days<br>Absenteeism<br>Turnaround<br>Amount of R & D activities |
| The customer perspective | Customer satisfaction (satisfaction for work place and facilities among<br>internal and external customers)<br>Cost quality ratio<br>Customer satisfaction for services<br>Cost-quality ratio for facilities services<br>Satisfaction for CREM department (hospitality, quick reactions, results<br>Information etc. |

***Source: Lindholm and Nenonen (2006)***

Lindholm and Leväinen (2006) linked up seven different real estate strategies to corporate strategies. The authors developed a detailed informative list of potential measures for each of the strategy as depicted in Table.2.4 below. A number of the numerous measures provided in this list were very useful to the current study along with those provided by other authors

| **Real estate strategy** | **Potential Measures** |
|---|---|
| Reduce cost | Occupancy cost per, square foot/metre<br>Occupancy cost per seat<br>Occupancy cost per employee<br>Occupancy cost per dollar unit of revenue<br>Occupancy cost as a percent of total operating expenses<br>Occupancy cost as a percent of operating revenue by business<br>Occupancy cost as a percent of operating revenue by building<br>Occupancy cost per unit of production<br>Occupancy cost as a percent of total labour and<br>Occupancy cost by building.<br>Space per square feet or metres per employee<br>Whether work place standard are used<br>Percent of space occupied<br>Percent of operational space versus non-operational space<br>Total owned and leased space/square feet or metres<br>Persons per seat<br>Number of moves per year<br>Cost of underutilized space<br>Real estate cost per CRE employee<br>Total CRE operating expenditure versus budget |
| Increase flexibility | Percent leased space relative to total space length of lease terms |
| Increase productivity | Used of virtual and flexible workplaces<br>Employees opinion on how well the work place supports their productivity<br>Distance among company sites and businesses<br>Time wasted with interruptions, expert space layout<br>Loss of business due to real estate service failure<br>Real estate spending as percent of gross earnings<br>Real estate spending as percent of total operating cost<br>Time spent on real estate projects versus time budgeted for projects<br>Amount of real estate advice given on other business units. |

| | |
|---|---|
| | Number of service provider service level agreements.<br>Number of transaction, projects and courses per FTE employee<br>CRE employee qualification<br>Employee turnover<br>Number of hours/time for real estate approval processes<br>Use of audits for service providers |
| Increase employee and internal client satisfaction | Distance to required transportation modes for employers.<br>Employee satisfaction with work environment,<br>Quality of indoor environment, lighting, temperatures, noise,<br>Work place (size shape)<br>Amount of nearby amenities for employees<br>Range of services offered by CREM<br>Employee/Internal customer satisfaction with responsiveness of CREM staff<br>Employee satisfaction with CREM staff professionals<br>Employee satisfaction with CREM information<br>CREM response time to requests<br>Competence of CREM staff<br>Investment in training per CREM employee |
| Increase innovations | Number of team work settings<br>Number of work stations per employee |
| Promote marketing and sales | Distance to required transportation modes for customers<br>Distance to customers<br>Use of company Logos and colours in workplace design<br>Image rating based on building attributes<br>Energy consumption/conservation<br>Number of energy audits.<br>Environmental sustainability of Buildings |
| Increase Value of Assets | Real Estate cost of acquisition versus returns (IRR)<br>Lease vs. construction or ownership cost comparisons<br>Aging reports for leases<br>Real estate holding costs per year<br>Number of building quality practices<br>Real estate return on investment<br>Real estate return on equity<br>Businesses return on real estate assets<br>Sales or revenue per square foot (Metre)<br>Space (square feet or metre) per unit end user of revenue<br>Market capital value versus book value for building<br>Percentage of surplus assets sold<br>Time to dispose of properties versus plan<br>Cost of disposal of properties versus savings<br>Time to clear buildings versus plan |

| | |
|---|---|
| | Number of development projects for obsolete properties<br>Status of risk management activity |
| Effectiveness i.e. corporate strategic processes | Percent of CREM employees indicating strong understanding or how their jobs fit into achieving of corporate objectives<br>CREM involved corporate strategic planning HR, IT, etc.<br>CREM actively involved in firm-wide initiatives such as special asset use, consolidations or shared services opportunities.<br>Number of formally and informal CREM meetings with top executives<br>Fulfilment of CREM strategic aims<br>CREM communications with top executives<br>Self-evaluation of how well CREM decisions support strategy |

**Table 2.4: Individualized Measures for the Performance Measurement Model of Lindholm and Leväinen (2006)**

**Source: Lindholm and Leväinen (2006)**

Moss *et al.* (2007) measured output of FM from three categories of quality, value and risk combined in a matrix with nine business drivers of performance, productivity, viability, flexibility, continuity, innovation, reputation, morale and identity. Tucker and Pitt (2009) included 11 service areas in their study. These are reception, health, safety, mail room, security, helpdesk, catering, grounds and gardens, cleaning, Mechanical and electrical engineering, and waste management. It is important to note that none of the researches used income earned by the building as a measure. Rather they examined value for money spent. This is because income earned by property is of little concern to the facility manager but of much greater concern to the property manager.

### 2.2.13 Office Buildings

This topic examines typical characteristics of office buildings that make them a unique investment or property class to owners, who could be private individuals or corporate owners.

It also examines the history of office buildings, their unique features and their need to create a functional and successful work environment.

In Europe the renaissance era brought changes to the business world in terms of more volume of business activities. By the mid-eighteenth century certain technological advancements have brought about increased manufacturing and rail transportation which made many businesses to locate along the rail lines and thereafter city centres. This situation created the urgent need for more business space and invariably brought about the development of office buildings.

The current era of knowledge workers, information technology and globalization have given rise to increasing complexity and greater dynamics in office building. It has also resulted in a greater need for building flexibility. Therefore office buildings apart from being dynamic are also products in transition. Buildings are complex arrangements of systems and subsystems. They are enclosures of space that serve as climate barrier modifiers and providers of protection and privacy. Buildings are important because they provide against adverse climatic conditions and enable activities and tasks to be carried out within conducive environments. They also reflect cultural inspirations and historical characteristics of a community. Buildings are also required to enable owners and users comply with statutory requirements (Douglass, 1996). Buildings provide basic elements like shelter, light, heat and sanitation. It provides spatial arrangement that can enable some activities and deter others such as communication, movement and privacy (Barret and Baldry 2003).

Buildings are predominantly static (immobile) and much larger in scale compared to other resources. Some other characteristics of buildings as real estate derive from its capital

intensive nature and long gestation period. Buildings are durable and usually survive through several decades. They are heterogeneous as no two buildings are exactly the same and they usually incur additional transfer costs. A very important characteristic of buildings which is most relevant to this study is that they require special operations or management outfits to operate the physical building structure and the support service, in a way that enables them to meet the individual or organizational needs of the users optimally and with minimum resources.

Buildings are generally not procured for their own sake. They are usually procured because they serve as important factor of production. Although, it is recognized that a building can be managed creatively and effectively to become an invaluable contribution to economic prosperity where it is poorly managed, it could easily become a huge liability. An office building is a built structure that serves as a work place that accommodates the information and knowledge processing activities of an organization such as communication, filling, supervising, directing and decision making (Pinder, Price, Wilkinson, and Demack, 2003). It is within office buildings that administrative and managerial work takes place. The economic effect of office properties are widespread, and could be on both the institutional owners and owners that are business organizations. Therefore effective management of an office building is bound to have relative effects on the value of the business of the client organization.

An office building could be dedicated to one organization or two or more organizations. In other words office buildings sometimes accommodate a wide variety of tenant organizations handling businesses in different sectors of the economy. In view of these users' needs and their interactions with their buildings are varied in terms of absolute space requirement, space

configuration, ergonomics and support service. The suitability of premises can therefore be related to measurement of performance (Bottom, McGreal, and Heaney, 1998). A suitable office building must provide adequate floor space, sufficient and adequate common space, access and circulation space, adequate tenant amenities and tenant specific work environment.

### 2.2.14 Concept of Building Performance

Globalisation, changes in technology and the ensuing competitiveness have created the need for comfortable and functional working environments. Building performance has been defined in BS 5240 as behaviour of a product in use. It has also been used to denote the physical performance characteristics of a building as a whole and of its parts. Hence, building performance relates to a building's ability to contribute to the fulfilment of the intended functions or use (Douglass, 1996). McDougal, Kelly, Hinks, and Bititci (2002) gave a consensus definition for building performance as the level of efficiency and effectiveness of the building or the quality of the facilities provided by it. They further stated that a building is considered an enabler i.e. the building may not in itself add value to the process but it facilitates the process and has the potential to cause process problems if not properly maintained. From the above definitions, building performance can be defined as the ability of a building to promote the achievement of the user's earmarked objectives effectively and efficiently using minimum resources. It can also be concluded that functional offices act as enablers in the achievement of the strategic and operational objectives of a company. These perspectives of building performance are further supported by authors such as Grimshaw and Keefe (1992) and Oseland and Bartlet (1999) in their researches, which established strong relationships between a good working environment and improved work performance. Performance measurements for office buildings and FM provisions have therefore become

quite important in view of the need to further demonstrate the added value of FM to organizations.

Building performance can be perceived from two main areas which are technical and functional quality (Brackartz and Kenley, 2002). Technical quality is concerned with the methods adopted in solving problems how efficiently they are solved. Functional quality revolves around the effort and way that the service was rendered e.g. attitude of FM staff to clients and their physical appearance (Barrett, 1995). Traditionally, corporate real estate managers measure performance on the basis of operational cost efficiency, using such indicators as maintenance cost, cost per square meter, etc. (Duckworth, 1993 and Bdeir, 2003). In today's terms building performance goes beyond this and actually entails how property decisions positively affect the core business of the firm and how the workplace supports the work processes.

### 2.2.15 Measures of Building Performance

A successful building is an amalgam of people, process and space (Kwok and Warren, 2005). The success of a building can be evaluated using measures that examine the attributes of the building. Douglas (1996) gave four dimensions of building performance evaluation as location, quality, flexibility and cost efficiency. Bottom *et al.* (1998) featured measures such as flexibility of lighting and light connection points (sockets), stability of power supply, draught prevention and access to disabled persons. In the works of Leaman and Bordass (2001) and Pickard (2006) some important measures of building attributes (performance) that were featured are noise measures such as banging of doors, random intrusion from public areas, noisy equipment like photocopier and time spent walking to common equipment such as

printers. There were also measures such as office layout, ventilation and air movements, security, thermal comfort and level of physical control of the environment such as lighting, sun glare, humidity, temperature and furniture. Some other no less important measures are building aesthetics, and internal / external decorations, adequacy of equipment furniture (in terms of number and quality) and telecommunication facilities. Others are adequacy and quality of health provisions, hygiene, quality of catering facilities, quality of social interaction points, and level of privacy.

Additional measures found in Perrott, Morgan and Fielder (2003) includes health and safety, good signage, good toilet provisions, adequate accident and fire prevention features and first aid provisions. Clark and Price (2002) and Clark, Price and Aklaghi (2003) both used measures such as cleanliness and tidiness, convenience of toilets and kitchen, overall comfort, configuration of space, internal layout, temperature and humidity control, ventilation, interior and external appearance, privacy, distractions, functionality and adequacy of workplace. Haynes and Price (2002) and Haynes and Price (2004) used 7 dimensions (factors) of distraction, environmental services, office layout, interaction, flexible space, comfort and informal interaction points. Some of the measures featured by these two studies under the above dimensions include interruptions, crowding, noise, privacy, overall atmosphere, ventilation, heating, natural and artificial lighting, personal storage, general storage, work areas, desk, overall office layout, circulation space, social and work interaction opportunities, physical security, creative environment, informal meeting areas, quiet areas, decorations, cleanliness, position of equipment, catering or refreshment area.

Clark *et al*, (2004) found three (3) common threads of evaluating occupants' view of building and workplace as comfort/interior environment, configuration and functionality. Configuration refers to facets of workplace that encourages interaction, while functionality has to do with building provisions that prevents distraction or threat to support service. Comfort is issues of internal environmental comfort. These threads are similar to the two in post occupancy evaluation (POE) i.e. Comfort and satisfaction with work environment. The "satisfaction with quality dimension" in POE can be likened to configuration and functionality in Clark *et al.* (2004).

Hinks and McNay (2005) cited in Lavy, Garcia, and Dixit (2010) used a long list of 172 items in their study under eight categories of business benefits, equipment, space, environment, lighting, thermal comfort, maintenance services, consultancy and general quality. Augenbroe and Park (2005) used 4 dimensions of energy, lighting, thermal comfort and maintenance. Lavy *et al.*, 2010 from a review of literature on KPI's for FM came up with 4 categories of measures. These are financial, functional, physical, and survey based categories. Some of the financial measures include; Operating cost, occupancy cost, utility costs, capital cost, building maintenance cost, grounds keeping cost etc. while the physical are space, energy and resource consumption, appropriateness and adequacy of space and accessibility while functional category includes productivity, space utilization and employee turnover rate.

All of the above dimensions and measures guided those that were selected for use in the current study. It is interesting to find that the measure "income earned by buildings" was not featured in any of these studies, while "location of building" was featured in only one of them i.e. Douglass (1996). This is probably because in 1996 the line between property and facilities

management was not as distinctive, but as FM continues to focus on occupants, space and work support, measures such as these became less relevant. In view of this observation these two dimensions were left out of the current study.

### 2.2.16 Applicability of Existing PM Tools to the Nigerian FM Practice

This aspect of the literature review is to enable the researcher identify the most appropriate tool or combination of tools to adopt in this study in order to minimize the specific constraints of application of existing PM tools to the Nigerian context. More importantly this section indicates the existence of a gap in research in terms of non-existence of a contextual tool for measurement of building performance. It therefore creates ground for the development of a bespoke predictive tool for measuring building performance as was achieved in this thesis.

Studies have indicated that FM supports core businesses by creating conducive working environments, but the ability to do this varies with local conditions and contexts (Tuomela and Puhto, 2001 and Chotipanich, 2004). Invariably, the appropriateness of PM tools will vary with the different cultures and local conditions. For example, Asian building performance standards have been found to be lower than that of most parts of Northern Europe (Wong, 2000). Therefore, it will be impracticable to adopt benchmark data from United Kingdom for building performance evaluation in Asia and impliedly for a developing country like Nigeria.

Most of the existing PM tools require well developed information and communication technology (ICT) systems. Nigeria came late and slowly into the use of ICT. She is therefore yet to fully commit to ICT integration (Yusuf, 2005 and Adeosun, 2010). Sizeable digital divide persists between developing countries like Nigeria and the developed ones (Golding,

Donaldson, Tenant, and Black., 2008 and Ihua, 2009), in fact, it is indicated that Nigeria possesses the lowest tele-density in sub-Saharan Africa in spite of the substantial spate of growth experienced between 2002 and 2006 (Obong, 2007). Consequently, the use of ICT particularly in the area of data processing and management is still limited, as people continue to depend on traditional ways for planning, research and business management. These limitations cut across various sectors of the economy such as; Education and research (Sangowusi, 2003; Osofisan and Osunade, 2005; Kamba, 2008 and Apanpa and Lawal, 2009). It also cuts across the construction industry (Oladapo, 2006) and small and medium scale enterprises generally (Golding *et al*., 2008; Apulu and Latham, 2009 and Kuteyi, 2009).

Some of the reasons adduced for this low integration and diffusion of ICT in Nigeria are poor physical infrastructure particularly with respect to irregular power supply, poor funding, lack of political will and commitment by government and other stakeholders, low data network connectivity, inadequacies of available software, non-availability of profession specific software, high cost of applications and software, mismatch of models from the developed world, obsolescence of computer software and hardware and high cost of hardware (Sangowusi, 2003; Oladapo, 2006; Lal, 2007; Apanpa and Kuteyi, 2009; Lawal 2009 and Adeosun, 2010). Other reasons are, low level of competence and skill of users, fear and anxiety towards ICT use, cultural factors and different concept and value system (Kunda and Brooks, 2000; Osofisan and Osunade, 2005; Yusuf, 2007; Adeyinka, 2009; Apulu and Latham, 2009) The implication of these studies for measurement of performance of FM in Nigeria is that, performance measurement tools which require sophisticated data analysis and management processes that are achievable only through high level adoption of ICT may not be applicable or easily adaptable in the Nigerian context.

Another major issue for the applicability of PM tools for building support service in Nigeria is poor disclosure of information by stakeholders in the corporate environment and poor reliability and inaccuracies of disclosed information, particularly financial disclosures (Wallace, 1988; Okike, 2000; Ali *et al.*, 2004; Adeyemi, 2006; Ofuegbu and Okoye, 2006; Umoren, 2009 and Games, 2011). Some of the identified reasons for the poor disclosures include fear of discovery of financial impropriety and acts of corruption, fear of competitiveness, inappropriate and non-commensurate sanctions for non-disclosure and provision of misleading information. Others are the culture of not making time to provide information unless there is immediate financial gain in sight and inability of company shareholders and stakeholders to insist that company executives disclose financial information, at all cost (Ahmed and Henry, 2004 and Umoren, 2009). With such laisser-faire attitude to mandatory disclosures, the implication for the more voluntary disclosures such as level of facilities performance can only be imagined. Impliedly, PM tools that rely on extensive and reliable corporate information disclosure and systematically collated benchmark data may be difficult to adopt in the current Nigerian practice.

PM tools with features that are mismatched within the context of the environment are incapable of bridging the gap between users' needs and expectation and could actually hinder the successful delivery of the building process. The aim of this section is therefore to examine according to literature, the features, strengths, limitations and applicability of some of the already developed FM performance measurement tools used in practice and conceptual tools. This is with a view to identifying the important attributes of a typical PM tool for buildings that will be applicable in Nigeria. Table 2.5 summarizes the features of a number of these existing performance measurement tools and their strength and limitations in the Nigerian

environment. The review includes few tools which (although examined from a different perspective) had to be re-examined under the theoretical framework section. This is because tools in this group have underlying theories and models that are needed in developing the conceptual framework.

The reviews indicate that none of these tools can be used precisely for the study in the current format and that there is a need to adapt one or more of the tools for the study in order to minimize the constraints and maximize the strength of these existing tools.

***Post Occupancy Evaluation (POE)***

POE is a strategic evaluation technique that measures performance of building in use against specified standards from the perspective of the user. The method was developed in the 1960's but was adapted and made popular by Preiser who chaired POE committees in 1987 (Preiser and Nasar, 2008). POE could be indicative, investigative or diagnostic in nature. Findings of POE are usually adopted in planning of real estate strategy and in providing guidelines for development. POE is used largely in public organizations and has served as a guide in corporate real estate and facilities decision making. As a diagnostic tool it can be used to indicate where renovations are required, establish maintenance policy and even to select appropriate properties for lease or purchase. POE is more useful for organizations with recurring construction programmes that require feedback that can be used in their building delivery cycle (Preiser, 1995). It is particularly relevant for feedback on success of a major change such as renovation works, improvements or new addition to building works. Preiser and Nasar have continued to use POE in case studies to evaluate the performance of building designs in order to develop a knowledge base guideline to guide designs. They

were able to collaborate on a project which resulted in systematic evaluations of 17 contemporary facilities from around the world using what they referred to as distributed technology. On line surveys and digital revolution has improved the prospect of POE in the developed world (Preiser and Nasar, 2008).

Post Occupancy Evaluation has been applied in the evaluation of building performance by few Nigerian researchers such as Obitayo (1995) and Zubairu (1999). In view of this it can be said to be relatively popular in the country. This is perhaps due to its relative simplicity and ease of use. It is however in most cases usually applied to measure general user satisfaction rather than to measure against stated performance criteria. In addition, it might be difficult to provide or determine performance criteria against which performance can be measured in Nigeria. However the relative simplicity and ease of use of POE will be reflected in the proposed tool. There are on-going improvements to POE. One of these attempts is the POE Probe (Post-Occupancy Review of Building and their Engineering Facilities) Project (McDougall et al, 2002).

***PROBE (Post-Occupancy Review of Building and their Engineering Facilities) Project***

This project started in 1995 as a joint venture between the UK government, a publisher (Building Research Information) and a research team. Findings of about eighteen surveys involving this project have been published by the year 2001 (Cohen, Standeven, Bordass and Leaman, 2001). The researches utilized 100-125 questionnaires which were issued to occupiers of the respective buildings. The occupants' responses were summarized under two major categories i.e. comfort and satisfaction (Leaman and Bordass, 2001). The factors were rated using a scale of 1-7, 1 for "uncomfortable" and 7 for "comfortable". Comfort was rated

using indices such as temperature, air quality, noise and overall comfort, while satisfaction was measured from design needs, productivity and health perspectives. Scores for each variable in each building were based on averages of the occupant's responses.

The probe sample was not randomly selected. The research used commissioned case studies, a fact which diminishes its usefulness as an average performance measure particularly in the Nigerian situation where there are little or no opportunities for commissioned research on facilities performance. Also, PROBE requires a team of highly experienced assessors to use it and these are not readily available within the Nigerian market. Furthermore, because it compares the ratings of the building in the case studies with that of benchmarks it needs reasonably large samples of building yardsticks to develop benchmarks (Bordass and Leaman, 2005).

***Service Quality (SERVQUAL)***

This is a method for measuring the quality of a service. It was developed by Parasuraman, Zeithaml, and Berry (1988). The tool adopts gap analysis techniques. It measures performance by establishing the difference between the assigned values of the quality of the required service and that of the service provided from the user's perspective. The special advantage of the method is that it highlights prominent gaps between users' expectation and quality perception of actual services rendered, where they may be present. This way, service providers can easily identify areas for improvement. The disadvantage is that most users have found the idea of scoring separately the expected and then the provided quality of a service difficult and time wasting (Cronin and Taylor, 1992 and Simpson and Barrett, 1996). There is also the problem of establishing a harmonious definition for the word

"expectation" i.e. is it desires or a tolerance band (Shaw and Haynes, 2004)? These identified disadvantages limit the adoption of this method in Nigeria, particularly in view of the low level of information disclosure. In spite of the identified disadvantages researchers continue to use gap studies in different forms to determine building performance. Such researchers include Pinder *et al.* (2003) cited in Clark *et a*l. (2004) and Tucker and Pitt (2008).

***Service Performance (SERVPERF)***

This tool measures users' perception on the quality of service provided by the support service providers. It is quite similar to SERVQUAL and was developed by Cronin and Taylor (1992) in response to the difficulties that respondents encountered in the use of the SERVQUAL method. The name SERVPERF is actually an acronym for service performance. The method has been found to be easier to use than SERVQUAL because it does not require measuring users' expectations; only perception on quality (Simpson and Barrett, 1996).

This method is less complex and will expectedly be easier to use in Nigeria than most others. It is however limited to only physical environment dimensions of office performance to the neglect of more process and user support related measures. This also limits its applicability to Nigeria in current times.

***Building in Use (BIU)***

This is a reliable instrument for evaluating an office environment from the perspectives of occupants by examining their need and experiences in their place of work (Lindholm and Nenonen, 2006). BIU was initiated by Vischer in 1989. The technique has potentials for being extended to include other support services and not just the physical office building. BIU is

similar to Post Occupancy Evaluation (POE) and in the same way, emphasizes user perspective and similar categories of indices as those indicated under the comfort and satisfaction indices examined in Probe POE. In fact Preiser (1995) stated that BIU is another name for POE though the name ended up not being adopted. The proposed tool will adopt this special strength of BIU to combine assessment of quality of support services with physical quality of buildings.

***The Balanced Score Card (BSC)***

This tool was developed by Kaplan, and Norton (1992). BSC is a strategic method which recognizes and reflects organizational strategy and objectives into its processes (Lindholm and Nenonen, 2006). The method integrates both the operational and financial measures into four perspectives of performance. An essential attribute of the approach is that it encompasses four perspectives which permit a balance between; short-term and long-term objectives; desired outcomes and the performance drivers of those outcomes and the softer more subjective measures. This attribute is the special strength of this tool and it is what earned it the name "balanced score card" (Amaratunga, *et al*., 2000).

Multiplicity of measures in the BSC may seem confusing to some people however, properly constructed scorecards contain a unity of purpose since all the measures are directed towards achieving an integrated strategy. Also the use of the tool is often constrained by the fact that its provided dimensions of measurement for performance but little guidance on how the appropriate measures can be identified, introduced and ultimately used to obtain the performance value. For the tool to be of practical value, the process of populating the framework has to be understood. To overcome this problem writers such as Lindholm and

Nanonen, (2006) and Amaratunga, *et al.* (2000) have done further work on populating the BSC with measures that could be adapted to suit each organisation's needs (Table 2.2 and 2.3).

Some other identifiable difficulties and characteristics that could make the BSC less suitable for the Nigerian environment are as follows;

- A major task when using the BSC is to devise a set of indices that will be particularly linked to each organization's strategy.

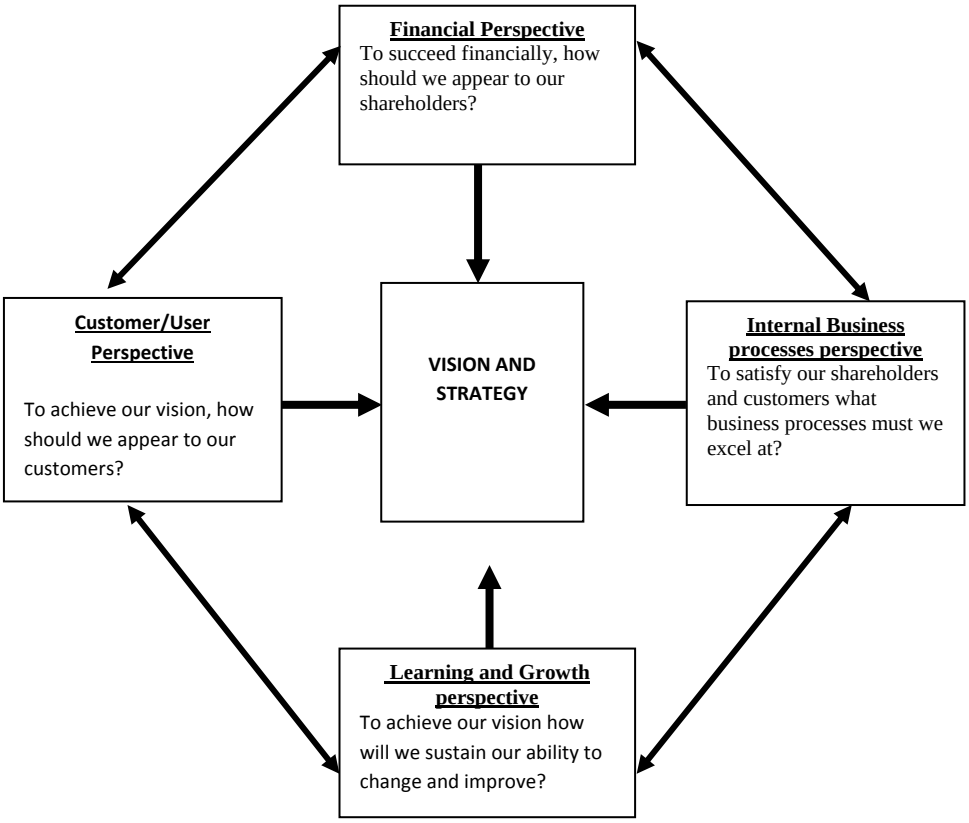



***Figure 2.1: Different Segments of the Balanced Scorecard***

***Source: Kaplan and Norton (1996)***

Many FM providers in Nigeria may find it difficult to garner the type of support (financial and otherwise) that they may need to perform this function because of the position they occupy within the hierarchy of the various organization.

- The relative low level of ICT integration and the aversion to information disclosure by Nigerians could make the multiplicity of the BSC measures a difficult issue.
- Poor technological capacity and application, poor infrastructure, obsolete equipment and low manpower. As a result of these, most practitioners may not find the BSC tool direct and easy to understand and use.
- This method reflects peculiar issues within an organization and does not lend itself for comparison across firms, practices and situations

In spite of the identified difficulties of BSC in Nigeria, this study recognizes that it has the special ability to measure the value that FM adds to facilities from the financial and non-financial perspectives of an organization's objectives.

***Service Balanced Score Card and Logometrix***

Service Balanced Scorecard and logometrix were developed for use in the public service, particularly local governments' authorities (LGA) where the main aim is not profitability but service provision. The service balanced score card is a variation of the balanced score card in that it considers both the financial and non-financial measures. It develops a set of scores against which the performance of facilities of average local government agencies can be compared. Like BSC it measures from four (4) perspectives. However, it uses stakeholders' opinion in determining performance objectives rather than management opinion as applicable in BSC. The ultimate score for the facilities of the LGA are then compared with average scores to determine performance. The method is an outcome of a pilot study conducted in a

local government area in Melbourne in Australia (Brackertz and Kenley, 2002). In Nigeria, these two tools have similar applicability issues as BSC, although comparatively they are less generally applicable, being limited to non-profit oriented facilities.

***Apgar Real Estate Score***

The Real Estate Score was created by Apgar (Apgar, 1995). It is a popular and quick method used by executives of large companies to measure the performance of their buildings in terms of quality and cost. It is based on five factors i.e. amount, price, grade, area, and risk. Each of these factors is a composite of relevant measures from a total of 150 measures developed by Apgar Consulting services. The five factors are measured on a scale of 0-2; 0 representing poor and 2 excellent. A composite score is obtained for each building by summing up the weighted average ratings for the five factors. Composite scores of six (6) and above out of a maximum score of ten (10) is considered to be good performance while a lower score indicates a need for improvement to cost and or space utilization (Lindholm and Nenonen, 2006).

The emphasis of this method is on cost and space utilization. This is deemed to be a limitation of the method as the areas of users' comfort and satisfaction which have equally strong bearings on workers' performance and loyalty have been disregarded. This reduces the versatility of the method and hence its usefulness as an average performance measure in the Nigerian context. An ideal measure should measure from both cost and user comfort/satisfaction perspectives. However its non-complex nature and little need for complex formulae and computer software should make it relatively easy to use in Nigeria.

***Hinks and McNay's (1999) Key Performance Indicator Model (KPIM)***

Hinks and McNay's (1999) research was based on a study of a balanced group of FM providers and business customers. This tool is also known as the Management by Variance (MBV) tool. Its main contribution is the development of a model of key performance indicators. It is a perceptual study in which respondents were requested to indicate key performance indicators for Facilities managers. The model comprises important individual factors that are measurable. The ultimate FM performance value is determined by the aggregate of the measured effect of these individual factors.

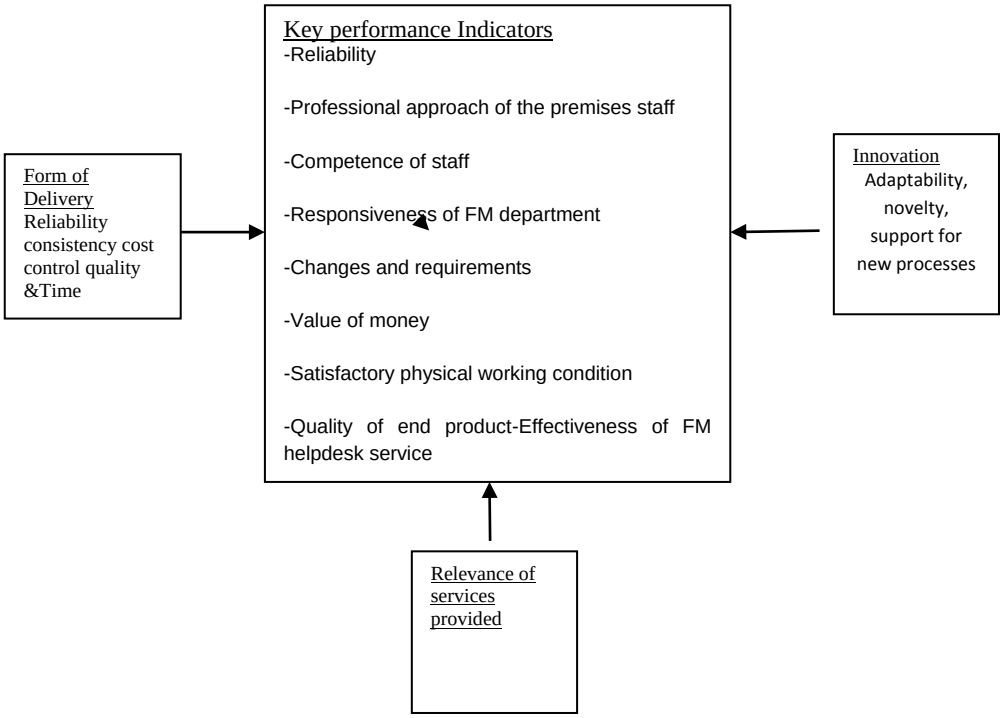



***Figure 2.2: Performance Measurement of the future***

***Source: Adapted from Hinks (2000)***

KPIs are general indicators of performance that focus on critical aspects of output or outcomes. The management by variance tool supports a structured creation of a custom list of KPIs of mutual interests to FM providers and customers (Byrne, 2011). The KPI concept was used by Shohet (2006) to develop 11 indicators for strategic maintenance of facilities in the healthcare sector. Similarly, in Moss *et al.* (2007) a specific set of KPIs was developed for a central government department in the UK while Lam *et al.* (2010) developed the project success index (PSI) - a KPI type set of indices for benchmarking performance of building maintenance projects. KPI is identified as the most popular performance evaluation model in construction and FM practice and was considered quite effective for performance evaluation by respondents in a study in Europe (Meng and Minogue, 2011).

Just as in benchmarks data, Key performance indicators will likely vary with context and time and may only reflect specific issues within an organization. Also KPI will be ineffective where inappropriate performance indicators are used (Meng and Minogue, 2011). These factors could make KPI less generally applicable. However, these limitations could be overcome as it is presumed that a more generally applicable KPI could be developed from a survey of user perceptions, using as many buildings as possible. The differences in performance requirements between nations and cultures (Chiotipanich, 2004 and Wong, 2000) could also make the KPIM much less relevant in socio-economic environments of a developing nation like Nigeria; particularly in view of the infancy of the FM practice in the country. However the relative ease of measurement and use of the tool will be advantageous in Nigeria. Although Hinks and McNay's (1999) KPIs may provide a guide of some sort, this observation about the context of its application reduces its applicability as an average performance measurement tool.

Hinks (2000) did some further work on this earlier study which made suggestions on how to improve the reliability of the earlier model. He stated that it is unlikely that there will be a single formula that can be used overall for measuring performance in all cases. This suggests that although the KPIM provides measurable indicators and is easy to use, as a tool it is rather simplistic. It is also not versatile and adaptable enough for general use.

Hinks (2000) therefore advised that the use of the model must be subject to the actual needs of the business for support services. In view of this he suggested that in addition to these performance indicators the measurement must reflect the company objectives and strategy more distinctively. This is to be done by incorporating three other categories indices: (a) Form or mode of service delivery; reliability, consistency, cost control, quality and time, (b) Innovation; adaptability, novelty, support for new processes; and (c) Relevance of services provided. These must be made to bear on the listed performance indicators. The improved model is depicted in Figure 2.2 as above.

Hinks (2000) however admitted the huge difficulties that can be encountered with a measure that requires taking each company's individual objectives into perspective and developing appropriate indices from it. This was probably the reason why he called this model the performance measurement of the future. If Hinks (2000) recognized the limitations that come with adopting this measure in developed nations in spite of the level of technological advancement and ICT integration, it can only be imagined how many more limitations it will encounter in Nigeria in view of the country's low level of technology and ICT infusion.

***Performance Value Model (PVM)***

This was discussed extensively by Oseland and Willis (2000). These writers observed that cost performance should be balanced with quality and that the ultimate measure of property performance is a correlation of how well a building supports activities taking place within it. Therefore the model combined both the traditional perspectives of finance with the more contemporary and soft measures like comfort and satisfaction of users. PVM derives from Total Quality Management (TQM) and has been tried and tested in the measurement of performance of office accommodation. It has also been refined over several years by Johnson's Control, a popular FM consortium in the UK (Oseland and Willis, 2000).

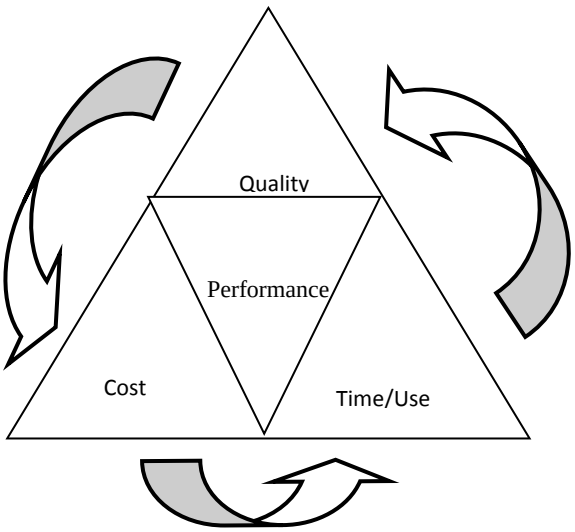



***Figure 2.3: - Performance Value Model***

***Source: Oseland and Willis (2000)***

A major difficulty of the tool is the constraint of the time and cost involved in obtaining accurate data. PVM adopts three metrics of performance i.e. quality, cost and time/use. Each

of these major factors are inter related. They affect one another and jointly determine office performance. (This inter-relationship is depicted in Figure 2.3).

The performance value that is obtained must be compared with industrial benchmarks. Each of the three elements is also measurable and comparable to benchmarks. This gives an indication of how comparably well or not the building is performing. The use of benchmark data in the adoption of this tool constitutes a limitation to the general use of the tool in the Nigerian context. This is in view of the shortage of systematically collected benchmark data in the country. Poor financial disclosure in Nigeria will also reduce the applicability of the financial aspect of the measurement. Time utilization survey (time category index) which focuses on efficiency of use of space can only be measured with great difficulties and in-accuracies. Furthermore, desk sharing as a way of improving space use is a concept that is yet to catch on in Nigeria. However, the flexibility of the model which enables organizations to track performance using only one, two or all three categories of indices together or separately will enhance its applicability in Nigeria.

***Usability Concept***

Usability is more of a facility performance measurement concept than a tool. It has been in existence in the information and computer technology industry since the 1950s. It is however less than a decade old in the construction industry (Blakstad, Hansen and Knudsen, 2008). Therefore, the full terms of the concept and its method of adoption are still undergoing modifications. Usability concept is being currently reviewed by a collaboration of research teams from nine countries, together with their industrial partners. Its development was necessitated by perceived deficiency in conventional building performance evaluation tools.

These earlier tools were said to focus on technical, functional and operational aspects of facilities (Blakstad et al., 2008). Majority of conventional evaluation methods, particularly POE and PFE methods and tools, fail to address strategic objectives, consider buildings out of context and tend to focus on the characteristics and performance of the physical environment, rather than on the effects on users and on benefits realization (Alexander, 2010).

Usability measures from the perspectives of effectiveness, efficiency and satisfaction in relation to the user's experience. It is concerned with a buildings' ability to support the users' objective and is time, place, context and situation bound (Alexander, 2008). This implies that its values change with different user groups, culture, work style and goals of the organization (Blackstad et al., 2008). Most usability studies are case studies that use qualitative techniques such as interviews and walkthroughs which may reveal many building deficiencies that could have been ignored by a survey e.g. access for the handicapped. Nevertheless it reduces the general application of the method internationally and particularly in the Nigerian context because of cultural and value differences. Also sometimes multi-professional team could be required to read accurate meanings into the interviews because of the inherent difficulties in the use of this instrument.

Usability is currently being applied to evaluation of performance of schools or learning environments in countries in Europe such as Denmark, Norway and The Netherlands. It takes cognizance of the cultural context of these facilities in terms of their contribution towards social development of the community in which they are located. A joint two-day research symposium among European countries has provided the opportunity of addressing usability

issues on educational facilities with teachers, pupils, researchers and educationists (Alexander, 2010).

***User Experience***

Usability concept appears to have given rise to a more recent but similar concept i.e. "user experience". It is said that while usability tends to focus on task efficiency and effectiveness, user experience includes wider human experience dimensions, such as pleasure and fun (Nenonen, Rasila, Junnonen and Karna, 2008). In explaining this relatively wider scope of user experience, Alexander (2008) stated that the measure includes additional criteria such as usefulness, desirability, credibility and accessibility. Usability is more focused on the user interface and how user friendly a facility is.

Walkthrough is the most common evaluation technique for user experience in usability. The walkthrough technique involves inspection tour of the building with selected users (with designated stops) in order to gather their experience in relation to the relevant topic. The biggest advantage of the walkthrough technique is the attainment of contextual knowledge of how various solutions work and to avoid reproducing bad solutions from one project to the other. An important limitation in the adoption of user experience concept of usability is the need to identify and develop relevant and widely accepted social anthropological tools that will measure user's experience from ethnological studies (Nenonen, Rasila, Matti, J. and Karna, 2008). The two day symposium on usability concept held by The International Council for Research and Innovation in Building and Construction CIB W111 held in 2010 attempted to minimize this limitation by unveiling a number of methodological framework for assessing

usability and results of practical application of the concept, tools and techniques (Alexander, 2010).

Hansen, Blakstad, and Knudsen (2011) used the walkthrough technique in evaluating user experience in case study action researches in Norway. From these researches they were able to come up with a proposal for a walkthrough design within a framework they named the USEtool. Blakstad, Olsson, Hansen, and Knudsen (2010), attempted to operationalize the relation of usability to effectiveness in the USEtool by developing a structured framework which combined the recognized methods of usability evaluation as walkthrough, interview and workshop with process description and easy to use guidelines. This should enable trained FM or user representatives to use the tool.

Some other usability concepts that emanated from the CIB W111 workshop apart from the USEtool are the Probal User Feedback system which proposes the measurement of usability from feedback information from the different users (Karna and Nenonen, 2010) and Jensen's two interrelated concepts of usability management of Continuous Briefing and Continuous Commissioning (Jensen, 2010).

***Real Estate/Facilities Performance Measurement Framework***

This was based on the idea of MicroScan, POE and BIU. "It provides a list of potential performance measures for corporate real estate managers to select from in creating a personalized performance measurement system that fits the firm's real estate strategies and information availability" (Lindholm and Leväinen, 2006 p 44).

The researchers advised that the strategy or perspective to be measured by each company should depend on the specific overall company objectives. This suggests that the method is not of general application and that the perspective and measures that will be adopted in each assessment process will vary with the company objectives. Although this attribute is a particular strength of this model as it makes it quite versatile and adaptable, it reduces its general applicability as a performance measurement framework in Nigeria. A facilities manager must play a very strategic role in his company and must be high in the organizational hierarchy to be able to garner the kind of support (financially and otherwise) that utilizing this type of measure usually requires (Simpson and Barrett, 1996). However, a number of the potential performance indicators from this model (Lindholm and Levainen, 2006) could be useful in Nigeria particularly, occupancy cost per square foot/metre, temperatures and noise levels and satisfaction with work place size and shape.

***Customer Performance Measurement Systems (CPMS)***

The CPMS was developed by Pitt and Tucker (2008) based on the contention that the conventional performance measurement tools have laid more emphasis on service delivery performance to the detriment of customer satisfaction measures. CPMS adopt a continuous improvement process and identify trends between key variables of criticality, efficiency and service provisions. The CPMS process commences with a national benchmark exercise to determine the generic customer satisfaction benchmarks. This is then followed by a measure of the FM service provider's performance using its client base. These two values are then compared to find the gap in the quality of service.

CPMS measures from three perspectives of workspace comfort, workspace resources and on-site services. It uses timely observation in determining down time. This requires an every thirty minutes check on use of space over a period of days. This can only be possible with a case study in a collaborative effort with a client. Therefore, the identified major difficulties with the application of this tool in Nigeria lie in its limitation to case study situations, the constraints of time and cost of collecting data and the likely level of inaccuracy of data that might have been collected in the establishment of a national benchmark.

***Benchmarking***

Bottom (2003) defined benchmarking as a process of comparing a produce, service process, an activity or object with samples from a peer group with a view to identifying best buy or best practice and targeting oneself to emulate it. Some of the identified advantages of benchmarking according to Broyd and Rennison (2000) are reduced cost, increased profit, improved service quality, improved timing for project delivery, increased staff satisfaction and transfer of technology.

Benchmarking is one of the foundations of both Total Quality Management (TQM) and Continuous Quality Improvement (Lindholm and Nenonen, 2006). Benchmark data are obtained from companies believed to be top competitors in the industry. It is important to ensure that benchmarking is done on similar parameters e.g. Operational costs per meter square or per capita, maintenance or occupation cost per meter square or per capita etc. Williams (2011) explained that it is not sufficient that the parameters are similar they must be adjusted using the plethora of variable resource drivers such as scope of service, shape and density of building, intensity of use, accessibility, service levels etc. Inappropriateness and

inconsistency of parameters and inadequate adjustments for the effect of these resource drivers creates failures for benchmarking (Bottom, 2003 and Williams, 2011).

Benchmarking is not merely a measurement and comparison technique but equally a business improvement tool that uses performance criteria among other measurements (Oseland and Willis, 2000 and Bottom, 2003). In fact it is so highly recognized as a business management tool in the UK and the developed world that the question is no longer "can I afford benchmarking, but can I afford not to benchmark"? (Broyd and Rennison, 2000). This recognition has attracted several collaborative research efforts and investigative studies, that have led to development of benchmark data such as, PROBE service offered by the CBI European Construction Institute (in the UK), Construct IT (IT based benchmark in FM), British Quality Foundation independent project analysis (private), Bernard Williams Associates *Estatesmaster* (private), AGILE Construction Initiative (University of Bath), IFMA benchmark data and in the US, National Institute of Building Sciences benchmark for facility performance.

Three main issues can be identified as limitations in the application of benchmarking in Nigeria. There are little or no known accurate and systematically developed benchmark data in Nigeria that can be utilized in the comparison (Adewunmi, Omirin and Adejumo, 2008 and Akintunde, 2009) and adopting benchmark data from across nations could be inappropriate and unrealistic (Wong, 2000 and Chotipanich, 2004). Secondly, benchmarking has been largely recognized as more of a business improvement tool than a tool of performance management. Lastly, benchmarking may indicate possible problems of financial control within an organization but it does not indicate the nature and extent of the problem.

***Service Level Agreements (SLA)***

In this approach, performance is measured by comparing the quality of services provided with what is stated in service agreements made with vendors. Service agreements are contract documents that guide the expectations of clients in service contracts. They outline the scope and nature of the service to be performed and the basis on which the performance of the service will be measured. A number of authors such as Simpson and Barrett (1996) and Nelson and Moss (2005) have described SLA as a performance measurement tool.

Service level agreements will typically provide information on the work schedule and its frequency, the standards required, method and performance criteria including issues of performance payment deductions. SLA will also contain other information as contractor obligations, commencement date and completion time of the agreement, contract sum, invoicing and payment and confidentiality issues. Others include how to deal with variations in the job scope and how to resolve issues of injury, damages and disputes.

The disadvantage of this tool is that the contract agreement could be difficult to draft and could neglect softer aspects of quality. However, where a representative sample of the consumers is used to develop the agreement using business need perspectives, there might be potential to develop a valid scale (Simpson and Barrett, 1996). Although it is recognized that even where a valid scale is developed they will be relevant only to the particular organizations for which they were prepared. This makes the tool less adaptable on a general basis. Also, SLAs are operational indicators; they are not critical success measures that can help organizations measure progress towards organizational goals (Nelson, 2006). Lastly, several different SLA's could be operative within an organization where different SLA's are initiated

by the different service providers. This could create confusion and inequality. It could also discourage efficiency and create unhealthy rivalry (Moss *et al*., 2007). These identified disadvantages reduce the applicability of the tool in Nigeria.

***European Foundation for Quality Management (EFQM) or Business Excellence Model (BEM)***

This is a tool for self-assessment that also serves as a veritable tool for benchmarking against other organizations. EFQM serves as a guide in identifying areas where improvements are required. This tool has the concept of excellence and adoption of outstanding practice at its heart (Robinson, Carrillo, Anumba, and Al-Ghassani, 2004). EFQM encourages organizations to emphasize cultural and processes issues. It encourages people to tap into intangible assets and empower them to maximize their potentials (Bhatt, 2011). An alternative name for the EFQM model is the Business Excellence Model (BEM). It describes cause and effect relationship between business enablers and result of business processes within an organization (Turner 2008, cited in Meng and Minogue, 2011). EFQM uses both financial and non-financial perspectives as with the BSC using 9 major criteria. Five of these criteria are enablers which covers what the organization does, while the remaining four criteria are the results or what the organization achieves (EFQM, 2011).

EFQM provides excellent result with respect to performance, customers, people and society, which are achieved through partnership, resources and processes (Bhatt, 2011). Innovation and learning from the results are feed cyclically to help turn the enablers into better outcomes. EFQM is the European quality award assessment framework and has had wide applications in the continent for self-assessment and continuous improvement, particularly within the UK

public sector organizations (Wongrassamee, Gardiner and Simmons, 2003). EFQM is the third most commonly used performance model in the UK and many similar models have been developed from its concept (Meng and Minogue, 2011). As with BSC a major task when using this tool in Nigeria will be to devise a set of indices that will be particularly linked to each organization's strategy using these 9 measurement criteria.

***Microscan***

This tool is quite similar to EFQM and BCS and in fact adapts BSC and benchmarking ideologies. It is based on four perspectives of finance, customer, innovation and processes. It utilizes a set of 80-100 Questions that covers the four Perspectives. Microscan combines financial and non-financial measures. It helps to identify development target and indicates required areas of improvements by showing at a glance, the balance between the above four perspectives (Atkin and Brooks, 2000).

The financial, innovation, customer and processes, perspectives of this tool make it quite versatile and generally applicable to average measurement of performance in Nigeria. This versatility is however reduced by the complexity and multiplicity of the measures, particularly in view of the infancy of the country's FM practice and the low level of integration of ICT and infrastructural development.

***Building Quality Assessment (BQA)***

BQA is a tool used for scoring performance of a building. This is done by relating actual performance to identified requirement for user groups in that type of building. BQA views users in two groups i.e. providers and occupiers and sees quality as relative rather than

absolute. This tool provides a means for a balanced assessment of the quality of building as a whole and its component part, against a range of requirements with the understanding that different groups have different needs (Clift, 1996).

BQA is a computerized system that indicates building service provision at a glance using 138 assessment factors under nine categories (presentation, space functionality, access and circulation, amenities, business services, working environment, health and safety, structural and building management). Categories 1 to 7 are concerned with the level of service that buildings provide to users, while 8 and 9 emphasizes how to retain this service. Each of these categories is divided into sections and further into factors. Each factor is measurable using a rate of 0-10; this score has to be multiplied by weight to reflect importance. Overall BQA is then obtained per building. Scoring is based on a plateau of developed review of current good practice. The scorings are done by trained assessors and have to be imputed into a computerized system to generate the reports. These can usually be done in a period of two days (McDougal, et al., 2002).

BQA allows you to compare overall building performance, category performance and scores at individual factor levels on a common basis, in different places, at any time. This researcher believe that this characteristic will enhance its versatility and applicability within the Nigerian FM practice and therefore hope to incorporate this provision in the proposed tool. However, the need for a trained assessor and computerized systems will diminish its overall applicability in the country.

***Quality Management Facilities (QMF)***

The QMF model was created by the Centre for FM, University of Salford and was first introduced by Alexander in 1992. It has developed into a matrix or tool through series of events (Moss, Nelson and Alexander, 2004). QMF emphasizes the customer's perspective. This tool perceives quality as the appropriate balance between performance and needs and can only be defined in reference to customers (Alexander, 1999).

QMF covers three (3) aspects of quality i.e. environmental quality, service quality and quality of FM process. It is similar to EFQM and derives from the TQM concept. It addresses 3 areas of FM strategy, processes and performance. It manages facility outputs of quality, value and risks to achieve organizational objectives of adaptability, performance and image. Each organizational objective comprises 3 business drivers making 9 drivers in all. The special strength of this model is that it links these drivers to FM output through the matrix to demonstrate how FM adds value to organizational objectives (Moss, *et al*, 2004). Each FM output serves as a KPI and although these KPIs are generic across organizations, the objectives vary and are therefore adaptable to each organization's needs**.** This ability to adapt to each organization's need is a strength that will enhance its applicability in Nigeria as it will help to demonstrate the effect of FM to organizational executive. However the multiplicity of measures is likely to make it complex to use and reduce its applicability**.** The Centre for FM has continued with action researches to improve the application of the QMF model. One of such researches was used in collaboration with a FM organization to develop a defined KPI for use in a central government department in UK (Moss et al., 2007).

Table 2.5, summarizes the details of the performance measurement tools that were examined. The list of tools in this table is not exhaustive, as a thesis cannot exhaustively examine all the tools of performance measurement that have ever been developed. Some of the tools that were not examined include, Quality Assurance and Total Quality Management (TQM) discussed in Robinson et al, (2004). Others are, Performance Map, Serviceability Tools and Methods (STM), Fishbein Expectancy Value Model and Soft Landing (Way and Bordass, 2005) and Customer journey (Nenonen et al., 2008). Incidentally, some of the tools that are left out are largely related to those that are examined in this paper. For example PVM evolved from performance Map and TQM which itself is related to Quality Assurance. Benchmarking is said to be the foundation of TQM and Quality Improvement, Customer journey is linked to Usability and User Experience concepts, while Soft Landing is related to POE and PROBE.

This review of literature reveals that the use of tools such as benchmarking requires the establishment of standards of measurements and benchmark data. In Nigeria currently there are few known systematically established benchmark data that could be utilized in comparisons and adopting benchmark data across countries is unrealistic because expectation and performance standards differs across cultures. This makes Benchmarking and other tools that require comparison with benchmarks such as PVM, CPMS, BQA, etc. unsuitable as a PM tool in the Nigerian context. POE and BIU are more for assessing success of a major change or improvement and not typically for measuring service quality. This factor makes them less generally applicable. These two tools are in many cases wrongly applied in Nigeria. Service BSC and Logometrix are also less generally applicable as they are more relevant to public service facilities.

**Table 2.5: Features of the Existing Performance Measurement Tools and their limitations in Nigeria**

| Tool or Method | Area of Application | Author (Year) | Essential Features | Strength | Weaknesses | Limitations for Application In The Nigerian Context |
|---|---|---|---|---|---|---|
| Post Occupancy Evaluation (POE) | Building/ facilities | Adapted by Preiser (1987) | • Measures performance of buildings against specified performance criteria from user's perspective.<br>• Relevant in assessing result of a major change, such as improvement and alteration or renovations.<br>• Findings are usually adopted in planning of real estate strategy and in providing guidelines for development | As it measures from user's perspective it helps in identifying users need.<br><br>It is relatively easy to use, once the performance criteria to be used is established | More for measurement of success of a change i.e. improvements or Adaptation.<br><br>More relevant to case studies than for general use. Does not combine with financial performance criteria | Could be difficult to establish performance criteria against which to evaluate performance in each case |
| Service Quality (SERVQUAL) | FM management process | Parasuraman, Zeithalm and Berry (1988) | • Adopts gap study. That is, it evaluates service quality by establishing from the user's perspective the gap/ difference between the assigned values for the expected quality of the service in comparison with the user's perception of the quality of the service provided | It measures from users' perspective thereby helping to identify their need. | Difficult to establish gap value as a harmonious definition for expectation does not exist yet. Some regard scoring the expected quality of a service as difficult and time wasting.<br><br>Does not combine with financial performance criteria | The idea of establishing quality gap might be too complex for average Nigerian users.<br><br>Respondents cooperation for the complex process may also be lacking because of poor attitude to information disclosure |
| Building in Use (BIU) | Building/ facilities | Viscer (1989) | • Evaluates office environment and support services.<br>• Adopts user's perspectives.<br>• Examines occupants experiences ,within their places of work.<br>• Uses seven performance dimensions based on 30 ratings. | Assists in identifying need of Users.<br><br>The measures are relatively easy to use | More for measurement of success of change i.e. improvement or adaptation<br><br>More relevant to case studies and commissioned cases. | Could be difficult for Facilities managers to garner the required support for its use in a case study situation, where this is applicable. |

| Tool or Method | Area of Application | Author (Year | Essential Features | Strength | Weaknesses | Limitations for Application In The Nigerian Context |
|---|---|---|---|---|---|---|
| Balanced Score Card (BSC) | FM management process | Kaplan and Norton (1992) | • Incorporates tangible and non-tangible measures.<br>• Attempts to achieve a balance between traditional financial measures and softer customer satisfaction criteria.<br>• Adopts four perspectives of finance, customer, learning and growth, and internal business process. | More versatile for measuring the value of FM as it adopts a combination of hard , financial and soft user measure perspectives | Difficult to device a set of Indices that will be linked to individual organizations' strategy.<br><br>Multiplicity of measures is sometimes confusing to users.<br><br>Captures specific organizational Adopts management (administration) opinion of performance objectives instead of users. | Infancy of FM and socio-cultural situations in Nigeria presents additional difficulties in devising a set of indices that will be linked to Individual organizations' strategy; also in handling the confusion that could emanate from the multiple measures.<br><br>Financial measures could be difficult to use because of poor financial disclosures |
| Service Performance (SERVPERF) | FM management process | Cronin and Taylor (1992) | • Developed in response to the difficulties of using the SERVQUAL method.<br>• It is also a service quality measure.<br>• Unlike SERVQUAL it measures quality of a service from perception rather than estimate of gap between expectation and Perception. | Assists in identifying need of Users.<br><br>Measures are much easier to use than in SERQUAL. | Concentrates only on physical environmental measures. Also, it does not utilize financial performance criteria in combination. | Limited to only physical environment dimensions of office performance, to the neglect of more process and user support related measures. |
| Quality Managed Facilities | FM management process | Alexander (1992) | • Derives from Total Quality Management (TQM) i.e. it is the TQM of FM<br>Uses nine hard and soft strategic business drive measures.<br>• Its Output is categorized under, quality, value and risk issues, while organizational objectives were categorized as adaptability, performance and image drivers | It enables users to build the required link between strategy and performance by linking operational measures with strategic objectives.<br><br>It is an improvement process that addresses needs of users by creating dialog among all stakeholders. It is adaptable for u individual organization through use of KPIs that are appropriate for each organization's specific objective | The tool has only been applied to case studies; this limits its general application.<br><br>It could be difficult for users to device KPIs that will be suitable to the individual organization's objective. | Intensive ICT adoption may be required for incorporating the individual organization's strategy perspective.<br><br>Low level ICT integration in Nigeria could limit its use. |

| Tool or Method | Area of Application | Author (Year) | Essential Features | Strength | Weaknesses | Limitations for Application In The Nigerian Context |
|---|---|---|---|---|---|---|
| Apgar real estate score | Building/ facilities | Apgar (1995) | • Measures in terms of quality cost.<br>• Based on five Factors i.e. amount, price, grade, area, and risk. Each, a<br>• composite of relevant measures from a total of 150 measures.<br>Uses a scale of 0 - 2. A composite score of between 0 and 6 out of a maximum score of 10 suggests a need for improvement | Relatively easy to adopt.<br><br>Does not require complex calculations or use of complex computer software. | Focuses on cost and space utilization and ignores other important areas such as users' comfort and satisfaction | It is less useful as an average FM performance measurement tool because it focuses on cost and space utilization and ignores other important areas such as users' and satisfaction |
| Post Occupancy Review of Bldgs and Eng. Facilities POE (PROBE) | Building/ facilities | William Bordass Associates, UK Govt. Halcrow Building In use studies Ltd (1995) | • Measures performance of buildings against specified standards from user perspective.<br>• Measures using category indices of comfort and satisfaction on a scale of 1-7 | Helpful for identifying users' needs.<br><br>Relatively easy to adopt. Does not require complex calculations and use of complex computer software. | Restricted to commissioned cases and adapted for case studies.<br>Its sampling frame is not randomly selected..<br><br>Does not incorporate financial measures. | Could be difficult to establish performance criteria against which to evaluate performance in each case. |
| EFQM European Foundation for Quality Management Model | FM management process | European Foundation for Quality Management (1996) | • Incorporates learning, Knowledge management and incremental innovation.<br>• Translates organizational objectives into a comprehensive set of Performance Measures .<br>• Uses a threefold appraisal technique i.e. approach, deployment, assessment and review. | . Identifies improvement opportunities and threats in organizations through a structured approach.<br><br>Establish a balance between needs of all relevant stakeholders | It could be difficult to device comprehensive performance measures that will be linked to individual organization's strategy.<br><br>Requires full support of organizational executives for facilities managers to use.<br><br>The multiplicity of measures could be confusing to users. | The idea of the creation of individualized performance measurement criteria that will be linked to individual strategy of organizations could require intensive ICT use and could be too complex to be adopted in Nigeria.<br><br>Infancy of the FM practice could make it impossible for practitioners to garner required cooperation to use the tool. |

| Tool or Method | Area of Application | Author (Year) | Essential Features | Strength | Weaknesses | Limitations for Application In The Nigerian Context |
|---|---|---|---|---|---|---|
| Hinks and McNay Key Performance Indicator Model (KPIM) | FM management process | Hinks and McNay (1999) | • Developed a model of key performance indicators, in the order of their priority.<br>• FM performance value is determined by the aggregate of the measured effect of these factors. | It is easy to measure and to generally.<br><br>The user perspective of its assessment will aid identification of user's needs | KPIs will vary with context and time. This implies that this tool could be less useful in a different environment and time frame | These set of indicators may not be applicable in the Nigerian environment because of socio-cultural differences and the infancy level of the country's FM practice. |
| Performance measurement of the future (PMF) | FM management process | Hinks (2000) | • Improvement on KPIM.<br>• Adapts KPIM by incorporating three additional category indices thereby enabling the model to reflect specific strategic objectives of each organization.<br>• Tagged PM tool of the future | Attempts to quantify the strategic value adding edge of the FM practice of each organization by relating the developed KPIs to specific organizations objectives. | Difficulties could b encountered with the use of a measure that requires taking each company's individual objectives into perspective and developing appropriate indices for them. | May be too sophisticated for use in Nigeria as it requires sophisticated software and deep support of organizational executives to appropriately link KPIM to specific strategic goals of organizations. |
| Microscan | FM management process | Atkins and Brooks (2000) | • Adapts BSC & benchmarking Ideologies.<br>• It is based on four perspectives of finance, customer, innovation and processes.<br>• It utilizes a set of 80-100 questions that covers the above four perspectives | Combines financial and non- financial measures. It helps identify development targets.<br><br>Indicates required areas of improvements by showing at a glance, the balance between these four different perspectives | Multiplicity of measures could be confusing to users | May be too sophisticated for use in Nigeria as the tool requires sophisticated software and deep support of organizational executive s to use |
| Performance Value Model (PVM) | Building/ facilities | Oseland and Willis (2000) | • Adopts three metrics of performance i.e. quality, cost and time/use.<br>• These factors are interrelated and affect s one another.<br>• The obtained PV value needs to be compared with benchmark data to determine performance. | Make provisions for enabling Organizations to track all three categories indices separately or jointly | Constraint of accuracy of data by way of time and cost of collecting it.<br><br>Also difficulty with obtaining systematically developed benchmark data | There is lack of systematically developed and contextual benchmarks.<br><br>The measurement of the Time/use category is too complex and almost impossible to use in Nigeria |

| Tool or Method | Area of Application | Author (Year) | Essential Features | Strength | Weaknesses | Limitations for Application In The Nigerian Context |
|---|---|---|---|---|---|---|
| Service Balanced Score Card | Building/ facilities | Brackertz & Kenley (2002) | • Specially designed for use in public service properties, particularly local government authority area's (LGA).<br>• Developed using sample from Australian LGAs.<br>• As in BSC, it measures from four perspectives. However, it uses stakeholders' opinion in determining performance objectives rather than management opinion as applicable in BSC. | More versatile for measuring value of FM as it adopts a combination of hard financial and soft user measure perspectives.<br><br>Useful for measuring performance of non- profit making facilities | Limited application in view of its special relevance to Public service facilities, particularly facilities belonging to LGA | Use of this tool is likely to be fraught with great difficulties in the aspects of the development of ratings of the measures. This stems from poor attitude to research in Nigeria and is further exacerbated by poor attitude public asset management |
| Usability concept | Building/ facilities | Collaboration of nine nations' research teams. CIB task group 2002-2005 in Construction Industry | • More a concept than a measurement tool.<br>• The concept measures from the perspectives of effectiveness, efficiency and satisfaction.<br>• It is concerned with a buildings' ability t support users' objective<br>• Uses qualitative methods of assessment such as interviews and walk-through. | Developed to improve on the deficiencies of conventional methods this focuses on technical, functional and operational aspects of performance.<br><br>It is time, place, context and situation bound. | Majorly relevant to case studies.<br><br>Existing measures for the concept are not universal but rather they vary with the user who could read different meaning into the interviews.<br><br>Also interviews could be difficult to conduct and sometimes require a multi-professional team. | Tool uses qualitative methods of assessment such as interviews and walk-through which are usually difficult to administer in Nigeria. |
| User experience | FM management process | Not Available ( 2005) | • This is also a concept.<br>• It evolved from usability, but attempts to include wider human experience dimension, such as fun, pleasure, usefulness, and desirability.<br>• Additional measurement criteria include credibility and accessibility. | Attempts to move beyond users need in the measurement of performance into the realm of quality of users' experience within the facility and the contribution of property to its cultural contexts | Still require the identification and development of relevant and widely acceptable ethnological studies & social anthropological tools that will measure user's experience; although these are coming up gradually | The measurement criteria are just too complex for the young Nigerian FM Practice. |

| Tool or Method | Area of Application | Author (Year) | Essential Features | Strength | Weaknesses | Limitations for Application The Nigerian Context |
|---|---|---|---|---|---|---|
| Real Estate/ Facilities Performance Measure (REFPM) | Building/ facilities | Lindholm and Leväinen (2006) | • It adopts tangible and non- tangible measures.<br>• It provides a list of potential performance measures for corporate real estate managers to select from in creating a personalized PM system that fits the firm's real estate strategies and information availability. | It attempts to measure performance from the perspectives of each company's specific organizational objectives using personalized PM system. | It is not of general application as the strategy or perspective to be measured would depends on each company's specific objectives | A facilities manager must occupy a strategic role in his organization to be able adopt this tool, in view of the financial and non-financial support it requires. This is difficult within the Nigerian FM practice |
| Customer Perception Measurement Systems (CPMS) | FM management process | Tucker and Pitt (2008) | • Developed in the contention that conventional performance measures lay more emphasis on service delivery performance to the detriment of customer satisfaction measures.<br>• It is another gap in quality measure. It commences with the gathering of a national benchmark data of customer needs followed by FM provider's performance measurement and lastly the gap between these two. | Focuses on customer satisfaction factors which aids identification of users' needs | Difficulty of accurately gathering required benchmark data, particularly in view of required cost and time of this process. | No available systematically developed benchmark to use in the comparison.<br><br>Furthermore, in Nigeria, the difficulty with gathering accurate benchmark data as required is more pertinent; particularly in view of the required cost and time and the inadequacy of research infrastructure. |
| Benchmarking | FM management process and Building/ facilities | Adapted by Rank Xerox | • Adopts historic accurate performance data against which data under survey can be compared<br>• Compares a produce, service process, an activity or object with samples from a peer group with a view to identify best buy or best practice. | Benchmarking is a very useful and handy facility and business improvement tool that can be used to reduce cost, increase profit, improve service quality, and timing for project delivery. It can also be used to increase staff satisfaction and transfer of technology. | It has been said that benchmarking is more of a business improvement tool than a tool of PM.<br><br>It could indicate a need for improvement but is not capable of indicating the particular improvement or why it is required.<br><br>To be useful, benchmarks must be used with a good overview of the specific cost centers of the comparison in order to ensure that the parameters of comparison are similar | Systematically developed benchmark data do not exist yet In Nigeria<br><br>Furthermore, , the difficulties with gathering accurate benchmark data in Nigeria is more pertinent, in view the required cost and time and the inadequacy of available infrastructure for research |

| Tool or Method | Area of Application | Author (Year) | Essential Features | Strength | Weaknesses | Limitations for Application In The Nigerian Context |
|---|---|---|---|---|---|---|
| Service Level Agreements (SLA) | FM management process | N/A | • Measures performance by comparing quality of service provided with what is stated in the service agreements made with clients.<br>• Service agreements are contract documents that guide the expectations of clients in service contracts. | Easy to measure as all that is required is a comparison of performance with the criteria provided in the SLA | The terms of the agreement could be difficult to draft and it could neglect softer aspects of quality. | A good quality service agreement that will take good cognizance of user's requirements may be more difficult to develop in Nigeria than in most other places This is due to the infancy of its FM & in-experience of the service providers |
| Building Quality Assessment | Building/ facilities | Building Research Establishment for Bernard Williams and Associates (1996) | • Indicates building service provision at a glance.<br>• Uses 138 assessment factors under nine headings.<br>• Uses two extreme measures, i.e. available or not; but also intermediate conditions.<br>• Scale is 0-10 and scores is to be established by trained assessors | Easy to adopt , once trained assessors are available.<br><br>It can be completed quickly ; in about 2 days<br><br>It provides common basis for measuring by different people at different places at any time | Silent on intrinsic value of items being assessed. It only indicates availability or lack of a service without any indication of the intrinsic quality of the provisions.<br><br>It presents a trained assessor's perspective instead of users. This may not provide room for identifying user's need appropriately | There is absence of trained assessor's in Nigeria. If they become available in future they may be too expensive and assessment could involve some biases.<br><br>Requires complex computer calculations to do the report. |

According to the study, some of the tools utilize processes that could be quite difficult to adopt in Nigeria because of problems of poor technological advancement, aversion to research, poor information disclosure among organizations and relative infancy of the FM practice. Examples of such tools are BSC, REFPM, BQA, and PMF. Another problem with this category of tools is the fact that currently most facilities managers do not occupy high positions in the organizational hierarchy. This makes it difficult for them to garner the type of financial and non-financial support that they require in adopting these tools. As stated earlier, the performance evaluation tools that are examined in this review are not exhaustive. In spite of this, the issues that were raised on the limitations and applicability of the examined tools are sufficient indication of the need for the development of new tools of performance evaluation (for buildings and the FM practice) that will eliminate or reduce these inadequacies and will be particularly contextual to the Nigerian socio-economic environment. This is one of the problems that this study intends to resolve.

## 2.3 REVIEW OF EMPIRICAL STUDIES ON FACILITIES MANAGEMENT AND BUILDING PERFORMANCE

This section reviews literature that are relevant to facilities management, performance measurement, building performance and performance indicators. It examines the concept adopted in these previous studies the methodologies and the substantive findings with a view to identifying gaps in knowledge which this current research could fill. Not many of these reviews were on studies based in Nigeria. In fact a significant number of them were studies done within Europe and USA. This is because of the relative infancy of FM in Nigeria (Adewunmi et al, 2008). Nonetheless a few Nigerian based studies that were found relevant were appropriately incorporated into the review.

Obitayo (1995) worked on building performance in Nigeria. She used POE to evaluate performance of buildings within Lagos State Housing Scheme. As typical of POE studies the research adopted a case study (Cohen, Standeven, Bordass, and Leaman, 2001) that is Dolphin Housing Scheme Phase One (1). The use of case study in her research limits the relevance of the study to performance measurements of average buildings in Nigeria. In addition the study adopted the environment approach which though investigative in nature is a partial rather than total building performance appraisal approach. As a consequence, the emphasis of the research was on design and spatial considerations while neglecting aspects such as, technical, cost, externalities and support for users. The research also did attempt to identify relevant building performance criteria in Nigeria or to verify the applicability of the indexes that were adopted through an empirical investigation.

Liefer (1998) focuses on health performance of office buildings. The study attempted to improve the method used by World Health Organization in a previous study, in the same study area in 1994. Due to the restricted focus only two group measures or perspectives were considered in the study i.e. satisfaction and comfort. Also in line with the specific area of study it incorporated Nuero-specific symptoms and allergic reaction measures, such as skin and throat irritation, lethargy, headaches etc. This makes the resulting measure quite contemporary and innovative as it enabled health issues like building health and sick building syndrome to be considered. These are undoubtedly two major health issues in workplace physical health today. However some of the 25 indices that are included in the study are considered to be superficial and not necessarily related to health. In other words they are more of comfort than health measures. For instance telephone privacy and work storage space. The restricted focus of the research also reduces its general application.

Odiete (1998) worked on the practical application of FM in Nigeria, particularly regarding its effect on building performance. The study adopted literature review and archival records as the source of its data. The author opined that FM has not found wide application in Nigeria and that its position as a discipline has not been well defined. He stated that the role of facilities manager depends on the organizational structure, effectiveness and efficiency of management system, focus of management and what it intends to achieve with its broad management policies. Odiete (1998) listed factors that could militate against the effective application of FM as including poor conceptualization of ideas, operational problems as a result of poor harmonizing of ideas of facilities manager with that of the organization, poor funding, inability to assemble right professionals, frequent change in management and inadequate training of facilities managers.

Using three properties i.e. Mobil House, Chevron Complex both in Lekki and Adamasingba stadium Ibadan as case studies (the first two from the private sector - oil industry and the third from the public sector), Odiete (1998) demonstrated that effective application of FM in Nigeria results in better performing facilities and buildings. The study provided some background information on FM in Nigeria, although it would have provided more useful information had it been empirical in nature. This study intends to bridge this gap through an empirical survey on FM effectiveness.

Akintayo (1999) attempted to examine the effect of FM on company profitability. Studies have linked efficient FM with worker's performance and invariably improved profitability. The study is to empirically demonstrate the possible relevance and usefulness of FM in enhancing profitability of average Nigerian companies that adopt it. The study had three (3)

major hypotheses. The first tries to establish if facilities investment constitutes 50% of average company total asset investment. This was confirmed in the research but the weakness of this research is that it concluded that once this hypothesis is confirmed, it means that profit levels are influenced remarkably by FM without carrying out any further analysis to establish the required relationship.

The second Hypothesis tried to establish a relationship between effective FM and profit level, but was also deficient in taking the profitability ratio as the indicator of effective FM as. Profitability ratio is the value of net profit divided by value of fixed assets. Secondly, it assumed that the style of managing property in each company is facilities management and that there is no distinction between it and other property management styles. In other words the research erroneously assumed that property care givers in all of the surveyed companies, practice FM and that once you take care of facilities you are a facilities manager. Hypothesis three (3) attempted to establish critical factors for effective FM using student t test. The study found that type, complexity and uniqueness of the facilities employed by the company are the most critical factors. However, most of the factors considered by Akintayo (1999) in this third hypothesis investigate the effect of nature of facility rather than nature and effectiveness of the support service provided, on the facility. This is a gap that the current research hopes to fill.

Ho et al (2000) reviewed current benchmarking practice of FM in Pacific Asia region. The research attempted to develop a custom made performance measure based on the importance rating and rating of the frequency of use of the individual metrics that were considered in the research. 97 indices which were extracted from literature were used. These were grouped under eight (8) major performance metrics. The metrics were separated into two categories

that is, performance measures and performance indicators. The researchers explained that the main difference between the two is that performance indicators are direct representation of the scale for individual organizations e.g. floor area and total occupancy, while measures are values that are comparable within organizations e.g. occupancy cost per employee and number of employee respectively or in another example occupancy cost per square metre and total floor space. The need for this distinction and for obtaining these two sets of data are not clear and actually appears like duplication as the values of one can be easily derived from the other. For example if floor area and total cost of occupancy is known occupancy per square metre can be obtained. This duplication actually appears confusing.

Another weakness of Ho et al.'s (2000) research is that much emphasis was placed on quantitative and financial measures as quite a number of the individual indicators were found to be related to either cost or consumption. This was at the expense of more qualitative measures of comfort and satisfaction as in the works of Kaplan and Norton (1992), Liefer (1998) and Brakertz and Kenley (2002). It is also not so clear why measures like competence of in-house staff and adequacy of budget will constitute factors for building performance measures, they appear to be more like measures of effectiveness of BSS providers. Lastly, in the analysis, there was only descriptive statistics done. To this effect the researchers mainly described the rankings from the mean item score for the various indices. The expectation is that some inferential statistics will be used to make some more concrete findings. For example narrowing these 97 matrixes to a number that will comprise only the significant matrices and attempting to build a model from these factors. Also, the performance measure is contextual to the Asia pacific socio-economic environment. This current research attempts to bridge these

gaps by developing a custom made building performance tool for Nigeria that will be devoid of the weakness identified above.

Shaw and Haynes (2002) attempted to develop a performance measurement framework that is beyond simple cost metrics. The study attempted to identify appropriate service dimension that will offer the facilities manager a structured measure that will help improve service quality. It used self-administered questionnaire. Group sessions were however used to generate initial line of questions for the questionnaire. 26 items were identified and respondents were asked to score them based on the level of importance they place on each item on a seven point scale. 201 questionnaires were analysed. Factor analysis was used to analyse the data and Keiser's criterion was used to extract factors with eigen value of more than 1. A scree plot was used to verify the result. A total of six important factors were obtained from the twenty six. Kruscal-Wallis test was used to examine if there are any significant differences in the ratings of the variables by the different various business groups. None was found - implying that all the dimensions should be managed by facilities managers equally. The research tried to overcome the weaknesses of previous research through the use of extensive pilot studies. Its limitation is the scope and its restriction to project management aspect of FM alone.

Bracketz and Kenley (2002) attempted to develop performance evaluation techniques for Local government council facilities i.e. for instances where the strategic aim of the organization are not profitability but service provision. This restricts the general application of this research. The study was to enable facilities demonstrate their probable usefulness to the community that they serve, thereby encouraging management to make strategic decisions about the future of these facilities. The research reported a pilot study that was conducted by

consulting stakeholders within a local government area in Melbourne, Australia. The study showed that financial measures, although capable of showing how facilities are doing financially, are incapable of indicating the facility's contribution to the organization's strategic goal. He therefore developed what he termed service balance score card which had its foundation in the work of Kaplan and Norton (1992).

The service balance score card examined four perspectives which are services, financial, community/customer and building perspectives, while the four perspectives in Kaplan and Norton (1992) are business process, customer/user, finance and learning/growth perspectives. Apart from this difference in perspectives, balanced score card uses management opinion in most of its ratings while this work adopts the perception of stakeholders. A weighted score that reflects importance of each perspective to organizational objective is then adopted. This score enables a comparison of the performance of the facility with similar facility within the organization local government, i.e. internal benchmarking or comparison with those in other local government councils, external benchmarking.

The attributes of a performing facility that were revealed include delivering wide range of services, having high number of users, use by a wide range of community sectors, good community support, providing services suited to the community, opening as long as possible and financial viability. Although quite elaborate as far as non-profit oriented facilities are concerned, the study was rather limited in application, particularly for a work environment where the strategic objective is profitability. In addition the restriction of the investigation to only one local government council also restricts its general application as culture; environment and situation have been found to largely affect the facilities manager's role (Chotipanich,

2004). Furthermore, the idea of asking stakeholders to score perspectives according to their effect on organizational objective might be difficult to achieve in Nigeria considering our attitude to research. All of these features create a gap which this current study intends to fill.

Adenuga (2008) worked on building performance measurement. The study found amongst others the following as major factors affecting effective maintenance management practices within the study area; Inadequate/inappropriate maintenance of facility plant and equipment for maintenance operations, lack of execution of planned maintenance programme, attitude of users and misuse of facilities, no adoptions of appropriate maintenance cycle for building maintenance and no long term arrangements being made for the supply of essential parts for replacements. These factors indicate that his research examined building performance as it relates to maintenance management and not overall BSS service. Moreover, his focus was on health buildings (Hospitals, both public and private).

Durodola (2008) worked on application of Facilities Management on hotel premises. The author examined the impact of management style on level of performance. Four classification were adopted; maintenance management, property management, facilities management and facilities benchmarking. It is unclear why this author regarded facilities benchmarking as a management style, as it is actually a FM performance measurement method. Also what he referred to as management styles are building support practices. One of the major findings in this study is that hotels that used FM are more effective compared to the those that used other "styles". In greater detail only one third of hotels which used maintenance management were adjudged effective while 67% and 87% were adjudged effective among those who adopt FM and FM benchmarking respectively.

Some of the benefits of FM according to him are improved functionality, improved patronage, strategic planning and implementation and proactive maintenance. This study also examined the major challenges to the holistic application of FM principle in hotel management. The most significant challenge was found to be concern for immediate return on investment followed by religious sentimentalism. Poor infrastructure and poor business promotion and marketing of hotel organizations were ranked 3rd and 4th most significant challenges respectively. Again, it is not clear why the above factors constitute "challenges to holistic application of FM" as they seem to be more of "challenges to profitable operation of hotel business" It appears that the author has confused these two problem areas. Through this study on evaluation of FM practice in hotels, Durodola (2008) filled some gap in the study area. However, the identified limitations created the need for a new study that would attempt to address some of these limitations. This current study evaluates application of FM within a different building type i.e. office buildings. It also identifies the needs of users and developed a contextual tool for measurement of office buildings.

Some of the previous studies reviewed above worked on a limited scope of issues. For example, some are restricted to design and spatial considerations or project management aspect of FM only while some others are case studies. Some focused on developing performance measurement techniques for non-profit making facilities and some worked on health and or hospitality buildings. Some of the authors worked in socio-economic contexts that are different from Nigeria's, while one of the studies focused on maintenance management. The limitations of these studies have created gaps in the aspect of contextual performance measurement framework, tools and benchmarks, particularly for office type of buildings thus necessitating research in these areas.

Akintayo (1999) attempted to determine the effect of FM on profitability of organization and not on buildings. None of the reviewed works attempt to establish the direct effect of FM on performance of office building through a user survey. Some of the works had analytical limitations while the study method and data analysis for some of the reviewed works were found to be inadequate or superficial. These identified issues are additional gaps which this study attempts to fill. Furthermore, this study identified a list of important measures for evaluating the level of effectiveness of FM service, which is contextual to Nigeria. It also developed a model for quantifying performance of office buildings and for demonstrating the influence of effective FM on building performance.

## 2.4 THEORETICAL AND CONCEPTUAL FRAMEWORK

### 2.4.1 Introduction

This section of the research draws on knowledge from past literature. It examines existing theories and review literature on concepts and model that are relevant to the research objectives, particularly the evaluation of the effectiveness of FM service and the measurement of office building performance. This is with a view to finding or creating a conceptual framework that will provide a guide for the empirical investigation in this study. The principles underlying the theoretical models reviewed in this section were combined with those examined in the literature review section in order to develop a conceptual framework that relates the dependent to the independent variables.

### 2.4.2 Theoretical Framework

Evaluating the effectiveness of FM is usually a difficult process because it involves the quantification of an intangible concept. The effectiveness of FM Service is intangible and

unlike products it cannot be visualized, inventoried, counted, tested, or verified in advance of sale to assure quality. Other characteristics of a service according to Parasuraman *et al. (*1985) are heterogeneity (meaning that no two service qualities are exactly the same) and inseparability (meaning that the act of production of services is inseparable from consumption). The quality of FM is something that is incorporated during service delivery and not at the manufacturing stage. The effectiveness of FM should be viewed as overall attitude held by customers towards the service, while the performance of buildings can be viewed as the extent to which building attributes meet the needs of users.

Facilities management and building performance evaluation have suffered greatly from a lack of consensus on the approach even within the broadly positivist survey based school (Clark *et al.*, 2004). Researches comparing design, cultural construct and productivity are lacking and as a consequence, each researcher projects different understanding featuring different stakes in their study. In spite of this lack of agreement on performance measurement approach, Clark *et al.* (2004) in a review of some previous studies found that results on measures and dimensions of building performance have been unexpectedly consistent. They found that in spite of the different nomenclature used in the studies, the dimensions that were uncovered in the various researches are quite similar while most variables loaded on similar dimensions (factors). This suggests that in spite of the lack of agreement of approach, a review of past works is likely to provide an applicable framework on the concept, process and dimensions of performance evaluation in FM that could serve as a veritable guide to the development of an appropriate framework on which this current study can be based.

Theories on performance measurement in FM are a rarity. This is due to the nascent nature of the practice. However, there are a few literature that presents theoretical models that have been developed on effect of FM on organisational performance and the evaluation of performance in FM. Therefore, the theoretical statements that form the basis of the conceptual framework that was used for this study were adapted and modified from these models. Two broad classifications can be made from these previous literature as follows;

1) literature that guided the development of the inter-relationship between the two constructs of the study i.e. effectiveness of FM and building performance and
2) Those that guided the concept and process of performance measurement in FM, as well as the dimensions of the variables to be used in the measurement of the two major constructs.

***Models that Guided the Development of the Inter-relationship between Effectiveness of FM and Building Performance***

Two models were examined in this category. These are Quality Managed Facilities Model (QMF) which established a relationship between FM output and organisational performance and Lindholm, Gibler, and Levainen's (2006) Framework for Identifying and Measuring Value Added by Corporate Real Estate Management (CREM) which provided the relationship between facilities/corporate real estate strategic decisions and organisational performance. Both studies measure effect of FM from its output and were therefore adapted for use in the current study.

| | | *FACILITIES MANAGEMENT OUTPUTS* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **BUSINESS DRIVERS** | | ***Quality*** | | | ***Value*** | | | ***Risk*** | | |
| | | ***Communication*** | ***Comfort & Satisfaction*** | ***Service Delivery*** | ***Cost Effectiveness*** | ***Assets Value Mgmt.*** | ***Investment Appraisal*** | ***Health & Safety*** | ***Corporate Social Resp.*** | ***Minimum disruption*** |
| ***Adaptability*** | **Flexibility** | | | | | | | | | |
| | **Continuity** | | | | | | | | | |
| | ***Innovation*** | | | | | | | | | |
| ***Performance*** | ***Performance*** | | | | | | | | | |
| | ***Productivity*** | | | | | | | | | |
| | ***Viability*** | | | | | | | | | |
| ***Image*** | ***Reputation*** | | | | | | | | | |
| | ***Morale*** | | | | | | | | | |
| | ***Identity*** | | | | | | | | | |

***Figure 2.4: The Quality Managed Facilities Model***

***Source: Centre for facilities Management (2001) cited in Moss et al. (2004)***

The Quality Managed Facilities Model (QMF) depicted in Fig. 2.4 was created by Alexander in 1992, in collaboration with the Centre for Facilities Management, University of Salford. The major theoretical statement of this model is that organisational objectives by way of

business drivers can be directly related to FM outputs, clearly demonstrating, where and when FM can add value to organisational performance (Moss *et al.*, 2004). In other words, the effectiveness of FM has direct effect on the achievement of organisational objectives. In QMF the organisational strategies are represented by 9 major business drivers whilst FM output is represented by 9 key variables that represent measures of the effectiveness of FM service.

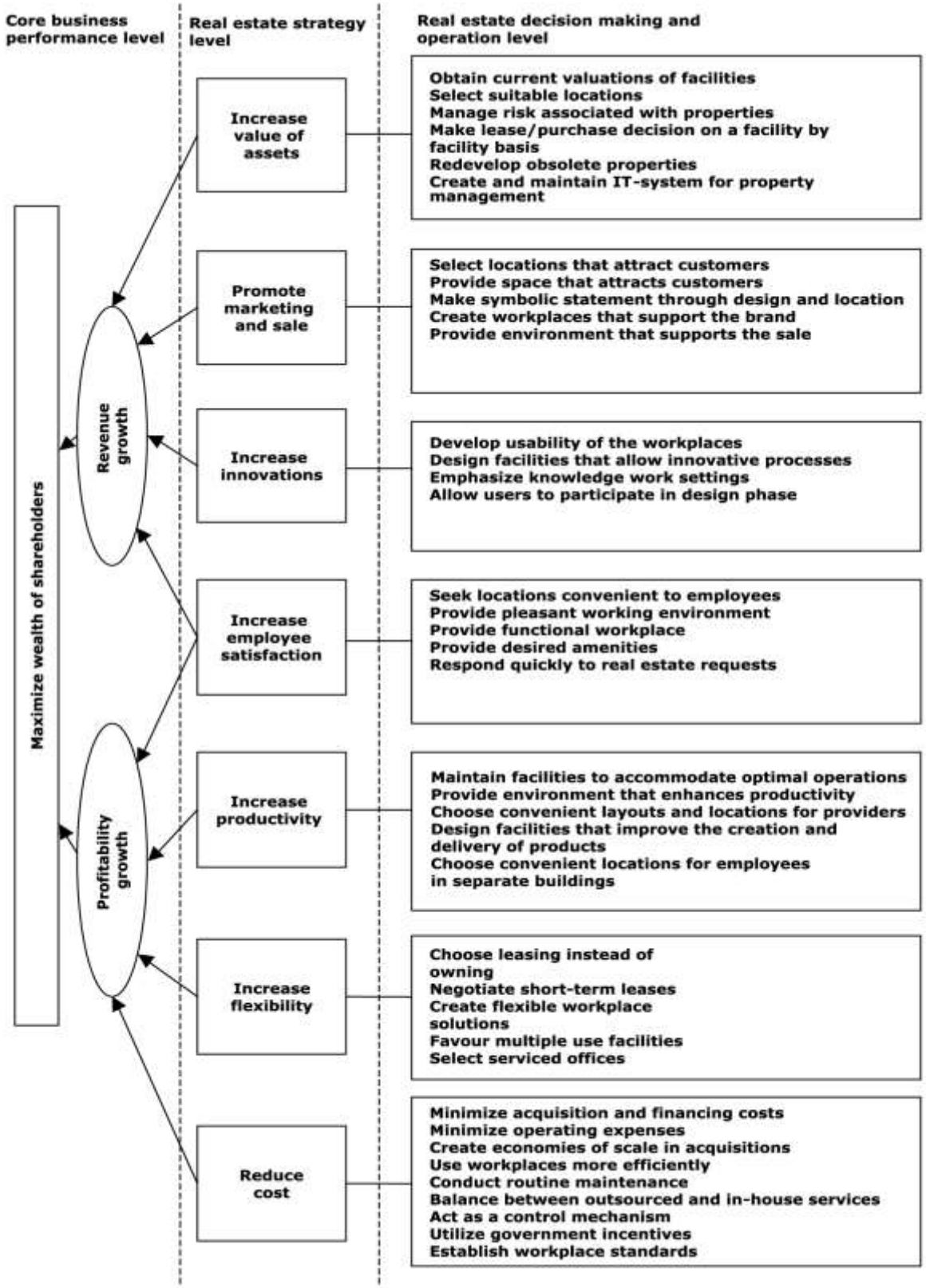
QMF links the business drivers to FM output through a matrix hence demonstrating how FM adds value to organizational objectives (Moss, *et al*, 2004). This feature of the QFM where the effect of FM on organisational performance is established by determining the relationship between the output of FM (measures of effectiveness of FM) and the measures of business performance (business drivers) were adapted into the conceptual framework of the current study. Hence, the effect of FM on building performance was established by measuring the relationship between the effectiveness of FM service and building performance, using appropriate measures for both constructs. As indicated in Fig 2. 4 the 9 adaptable indicators of effectiveness of FM output used by QMF and the 3 categories into which they belong are; Quality (communication, comfort and satisfaction and service delivery); Value (cost effectiveness, asset, management and investment appraisal) and Risk (health and safety, corporate social responsibility and minimum disruption). Although some of these measures were used, this current study widened the scope of the measures significantly by using dimensions and measures indicated in other literature on dimensions of performance evaluation in FM.

The theoretical statement of the Lindholm *et al.* (2006) Model for Identifying and Measuring Value Added by Corporate Real Estate Management (CREM) is that corporate real estate adds

value to core business and wealth. That is, there is a direct relationship between real estate strategic decisions and achievement of core business objective. The model was developed from previous works of the authors involving a survey of how real estate/ facilities add value to achievement of organizational objectives of twenty-six (26) firms.

The Real Estate/Facilities Performance Measurement model was tested on a set of questions each of which indicates the condition of one of the following seven added value perspectives or strategies of; increase value of assets, promote marketing and sale, increase productivity, increase innovation, increase employee satisfaction, increase flexibility and reduced costs (Figure 2.5). These seven added value perspectives or strategies were created from two major needs of revenue growth and profitability (Lindholm *et al*., 2006). The model indicates the relationship between these FM/CREM strategies and business performance. It also indicated the link between strategic decisions and the measures of these decisions.

The feature of the CREM model in which the effect of CREM on achievement of business objective is established through the relationship between the measures of strategic CREM decisions and business performance, also guided the conceptual framework of this current study. Hence the effect of FM on building performance is established in the current study by identifying the relationship between the measures of the effectiveness of FM service and the measures that determine building performance.




**Source:** Lindholm *et al.* (2006)

***Figure 2.5: How real Estate decisions Support Strategies and Core organizational objectives Source: Lindholm et al. (2006)***

***Models on Facilities Management Performance Evaluation Concepts, Process and Dimensions***

Review of literature indicates that performance evaluation in FM are developed around two major concepts of disconfirmation (expectation) and perception (Robledo, 2001 in Shaw and Haynes, 2004). This has led to two popular models of performance measurement in FM, i.e. the service quality (SERVQUAL) gap and service performance (SERVPERF) models by Parasuraman et al (1985) and Cronin and Taylor (1992) respectively.

SERVQUAL model measures performance by establishing the gap between expectation and perception of quality using gap analysis techniques. In other words, the theoretical statement of the model is that FM performance can be indicated by how wide the gap between the users' expectation and perception of the quality of a service is. It establishes the difference between the assigned values of the quality of the expected service and the quality of the actual service provided from the user's perspective. For an organization's management, gap analysis is important in indicating aspects of a service that requires attention in the short or long run. However, methodologically the SERVQUAL model poses some difficulties one of which is the task of scoring the expected and the perceived quality of service by the same respondents separately. There is also the problem of establishing a harmonious definition for the word "expectation" i.e. is it desires or a tolerance band (Shaw and Haynes, 2004)? For these reasons the concept of this model was not used in this study.

The SERVPERF model (which measures users' perception only, on the quality of service provided) evolved from the SERVQUAL model in an attempt to overcome these difficulties and in the realization that in spite of the difficulties of the gap measure it is not necessarily

more reliable than measures that are based on perception of quality alone (Cronin and Taylor, 1992; Simpson and Barett, 1996 and Lee, 2006). In view of this, the SERVPERF model was used in the conceptual framework for this current study. Cronin and Taylor (1992) established a direct relationship between customers perception of service quality and customer satisfaction. In line with this, the conceptual framework for the current study also attempts to establish a direct relationship between effectiveness of FM and building performance (customer satisfaction with building attributes).

Performance measurement in FM transcends the issue of concept to embrace the process and dimensions of the measurements i.e. what process should be followed in the measurement and what dimensions are to be measured? Measuring the wrong dimensions could result in the loss of efficacy of service performance measurements and in the making of poor decisions. Measurements that are based on wrong dimensions could actually become confusing and misleading (Shaw and Haynes, 2004; Alexander, 2006; Moss *et al.*, 2007 and Meng and Minogue, 2011). In view of this, models that examined the process of FM performance evaluation and those which provided the applicable dimensions of measurement for the study were examined next.

The flagship theory that guided the process of performance evaluation and the dimensions featured in this study is the systems theory. Systems theory came into the forefront in the 1960's. It translates optimization principles and methodologies from engineering to organizations and social systems (Stewart and Aures, 2001 in Straub, Koopman and Mossel, 2010). The difficulties of using the hard models of systems thinking to describe human phenomena necessitated the use of the softer relationships and networks of actors in

complexity theory. Several actors make different contributions in an organization. The organization has a clear causal relationship with the actors and objects in its environment. Conceptually, the systems approach considers organization or parts of an organization as separate systems operating in an environment. Therefore using systems approach in complexity thinking makes the measurement of performance in FM a practical exercise (Straub, Koopman and Mossel, 2010).

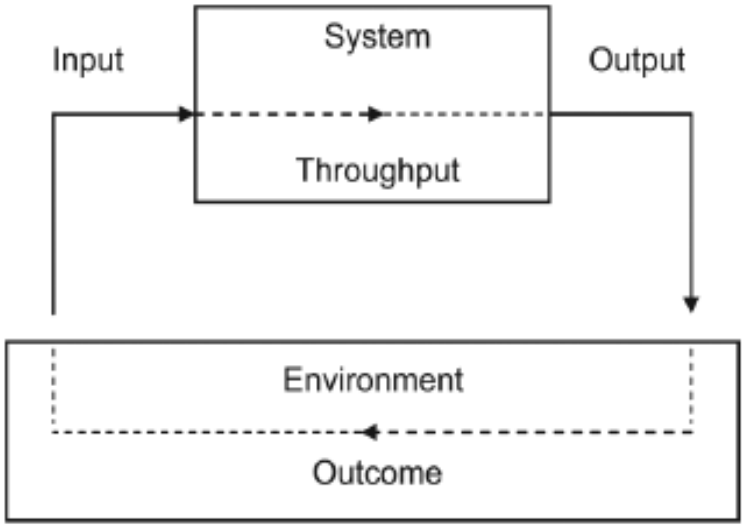



***Figure 2.6: System's theory Model of performance process***
***Source: De Leeuw (1990) cited in straub et al., (2010)***

A system is separated from its environment by a clear border and interacts with its environment through exchange of materials energy and information (Figure 2.6). All incoming interactions are referred to as the input, while the outgoing interactions or effects on the environment are known as the output. In a dynamic sense a system can be regarded as a process (also known as the throughput) which transforms input into output. In this vein, both FM service and buildings can be regarded as systems with inputs and outputs and which use processes to achieve scientific outcomes (Figure 2.6). The major task with

the use of the systems theory in FM is in deriving appropriate and relevant measures for each of the performance dimensions of the input, process, output and outcome. Once this is achieved the measurement of the nature of FM can be undertaken.

Brown's (1996) performance process model took a cue from the systems theory. Brown (1996) developed a framework for dealing with the performance processes in micro process levels. He suggested that the performance of FM processes should be evaluated in terms of input, process, output and outcome measures and provided various FM relevant constructs and measures for the measurement of each of these four dimensions (Figure 2.7).

| IMPUT | PROCESS | OUTPUT | OUTCOMES |
|---|---|---|---|
| • Skilled, motivated, happy employees<br>• Customer requirements (needs)<br>• Materials<br>• Capital<br><br>**INPUT MEASURES**<br><br>• Employee satisfaction<br>• Asset measures | • Design of products and services<br>• Production process<br>• Delivery of service<br><br>**PROCESS MEASURES**<br><br>• Process and operational measures<br>• Continuous improvement measures | • Products<br>• Services<br>• Financial Results<br><br>**OUTPUT MEASURES**<br><br>• Product/service measures<br>• Financial measures | • Delighted end users<br>• Organizations' needs met<br><br>**OUTCOME MEASURES**<br><br>• Customer satisfaction<br>• Deliver best value for money |

***Figure 2.7: FM Performance process***

***Source: Brown 1996***

Input measures cover issues such as quality and quantity of input; process measures focus on cycle times and process parameters; output measures monitor quality and dependability of output; and outcome measures the impact of the output. Authors such as Moss *et al.* (2007) and Ninh *et al. (*2010) have used the dimensions in the systems theory as indicated in Brown's (1996) performance process model to develop appropriate frameworks for their research, particularly in deriving relevant measures or performance indicators. Brown's process model features both the tangible - financial and intangible - nonfinancial aspects of performance and was quite useful in providing measurement dimensions to guide the current study. However, the model could not be used as it is, because the various measures that were featured are more of broad constructs rather than individual measures as required in this study and also because it is process focused.

The management by variance model featured important measurement dimensions for FM service such as client satisfaction, responsiveness, service reliability, safety, staff performance and cost effectiveness (Hinks and McNay, 1999). The SERVQUAL model apart from introducing gap analysis in the measurement of service quality also provided relevant dimensions for measuring the performance of FM service. The SERVQUAL model provided a 22 item scale for measuring FM service. These were featured in ten dimensions as depicted in Figure 2.8. In the author's latter work the ten dimensions were reduced to the five dimensions as follows (Parasuraman *et al.*, 1988):

- Reliability:- Ability to perform the promised service dependably and accurately ( has five items or measures)
- Tangibles:- Physical facilities equipment, communication provisions and appearance of personnel (has four items or measures)

- Responsiveness:- Willingness to help customers and to provide prompt service for them (has four items or measures)
- Assurance:- Knowledge and courtesy of employees and their ability to inspire trust and confidence (has four items or measures)

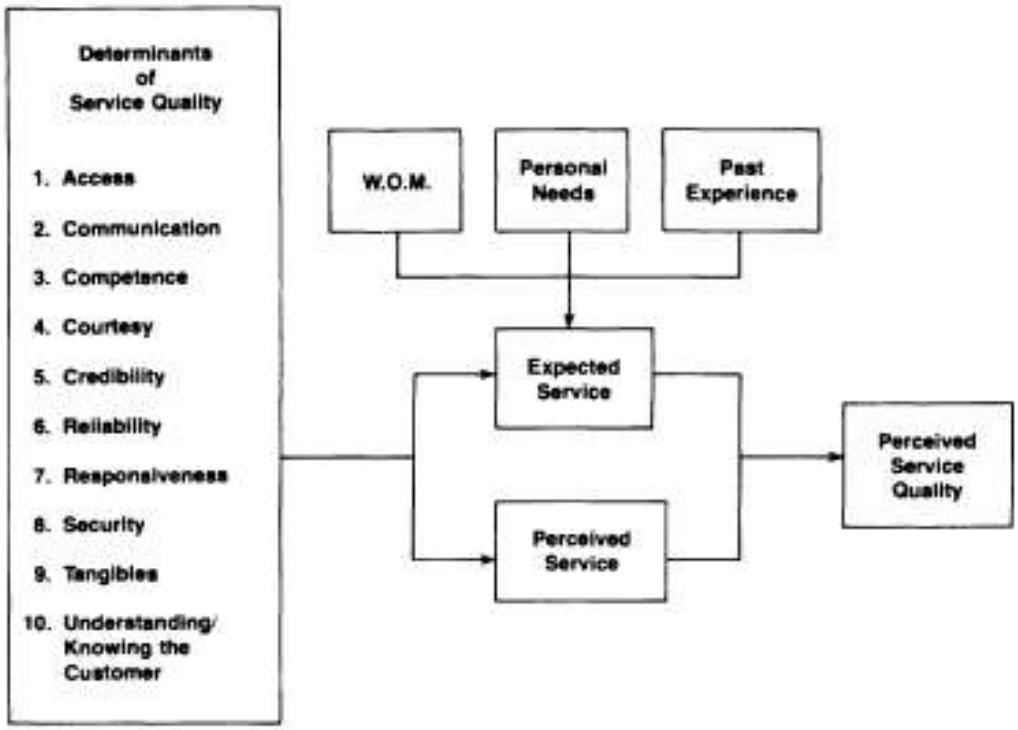



***Figure 2.8: Determinants of Perceived Service Performance***

***Source: Parasuraman et al. (1985)***

- Empathy:- Caring, individualized attention which the firm provides to its customers (has five items or measures)

The dimensions above can be related to the four constructs in the systems theory. For example, the “tangibles” dimension can be related to the “input” construct, “empathy” and “assurance” to the “process” construct and “responsiveness” and “reliability” can be viewed from the

perspectives of the “output” and “outcome” constructs respectively. Furthermore, Parasuraman *et al.* (1985) explained that these dimensions were based both on the process of service delivery of a service and the outcome. This makes it more relevant to this study.

The dimensions in the SERVQUAL model has become quite popular with authors including those in FM, such that by 2003 it has been used in no less than 30 published studies (Hoxley, 2007). One of the reasons for this popularity is its recognition as a veritable tool for measuring service quality which itself has been associated with favourable customer behavioural intentions and has been found to have a direct influence on customer satisfaction. However, many of these authors have recommended that the scale should be adapted to suit each particular service setting. In view of this the dimensions in the SERVQUAL model will be featured in the conceptual framework for this study after being adapted to both the service setting and the Nigerian socio-economic context.

Having examined models that provided a guide for the dimensions for the measurement of effectiveness of FM, this study also reviewed applicable literature to guide the dimensions for the evaluation of the building performance construct. An important literature in this category is Pinder’s (2003) workplace utility measurement plot (figure 2.9). He developed a 22 item scale with four dimensions for the measurement of building performance.

The following are the four dimensions and a summary of what each represents;

- Space configuration (Space allocation adequacy, and flexibility, space layout, circulation and interaction space)
- Environment (With comfortable temperature, temperature control and flexibility, ventilation, humidity)

- Appearance (Modernity of internal and external areas of building and level of tidiness)
- Functionality (conversational privacy, functionality of equipment, adequacy of workspace)
-

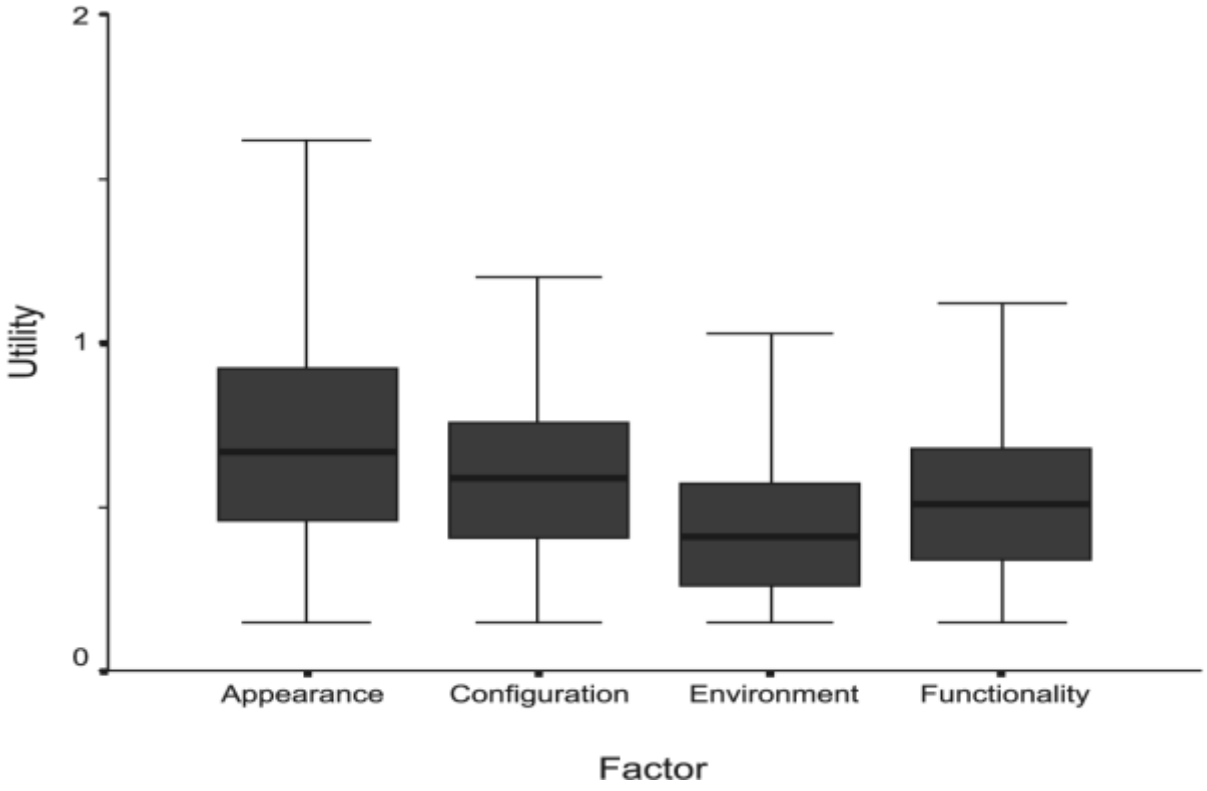



***Figure 2.9: Plot of measurement of workplace utility***

***Source; Pinder (2003)***

Two major categories of building performance measurement dimensions that were featured consistently in literature are "satisfaction with work environment" and "comfort of work place". Hence, the conceptual framework for this study also adopts these two major category indices. An example of such literature is the PROBE project (Cohen, 2001) with measures in the comfort category including temperature, air quality, noise and overall comfort and those in the satisfaction category including design needs, productivity, safety,

functionality, conglomeration and health perspectives. Similarly, the POE (Preiser, 1995) featured measures such as temperature, air quality and noise in the comfort category and others such as productivity, design needs and health issues in the satisfaction category. Some other dimensions for the measurement of building performance that guided this study such as quality, cost and time / intensity of usage of space, were featured in the performance value model of Oselland and Willis (2000). Others such as size, use of facilities, maintenance, refurbishment, cleaning, energy consumption, ground and environment, safety, security and parking were featured in Ho *et al.* (2000).

### 2.4.4 Conceptual Framework for the Study

This research adapts the theories from the theoretical models that were reviewed in this study in order to come up with its conceptual theory. Hence the conceptual theory on which this work is based is that the effectiveness of FM service in a building is positively related to the building's performance. This implies that the performance value for a building can be predicted from the level of effectiveness of its FM service. It is also based on the theoretical statements that effectiveness of FM can be evaluated from three category perspectives of "financial performance", "quality of service" and "crises response and management", while building performance can be measured from three perspectives of "financial", "satisfaction with work environment" and comfort of workspace.

Lindholm *et al*.'s (2006) model of effect of real estate strategic decisions on achievement of core organizational objectives is particularly versatile and adaptable. It demonstrates how real estate and or facilities add value to the core business of organizations, a factor which makes it quite relevant to the aim of the current study which is to demonstrate the influence of the

effectiveness of FM service on building performance. In view of this, the model was adapted for the conceptual framework in this current study. Essentially, the conceptual model for this work is an adaptation of Lindholm's *et al*. (2006) real estate strategic decisions model. Other models that provided a guide to this research included the QMF model, the systems theory, Browns' performance process model Pinder's workplace utility plot and the SERVQUAL model etc. As with the systems theory, the framework included dimensions that measure the performance of the input, output, process, and outcome perspectives of the two constructs (building Performance value and effectiveness of FM) using potential dimensions of measures that were obtained from these various models.

As indicated earlier, categorization of measures is a popular feature of many of the FM performance measurement studies. Douglass (1996) discussed the importance of sorting cost related and non-cost related measures separately. Similarly, Lavy (2010) discussed the importance of categorization and explained that such categorization must provide FM professionals the opportunity to select the category of performance indicators in which they are most interested. It is in view of this that the conceptual framework for this study adopts three categories of indices for each of the two major constructs (effectiveness of FM and Building Performance) measured in this research as in a tripod. It is this which earned the conceptual framework its name; the Tripodal Performance Value Model (TPVM). The framework is depicted in Figure 2.10.

***Operationalization of variables in the Conceptual Framework***

In view of the conceptual theory of the framework stated earlier, the study establishes that the independent variables have a predictive effect on the dependent variable. This makes it

possible to build a regression equation and invariably a mathematical model of the relationship between the two variables. In view of the established relationship, this model can be used to quantify the contribution of each building's FM service to its performance. It can equally be used as a veritable tool to measure the performance of office buildings.

The effectiveness of FM (the independent variable), is measured from seven dimensions as follows:

1) Value for money spent in procurement of building and services,
2) Prospect for rental growth,
3) Professionalism and timeliness,
4) Good quality end product,
5) Functionality of work environment and equipment,
6) Management of building and public service emergencies and
7) Management of poor regulatory policies.

These dimensions were classified into three broad categories of indices of Financial, Quality of FM service and Crisis response and management (Figure 2.10).

Similarly, building performance value (the dependent variable), is made up of 10 (ten) different dimensions as follows;

1) Unit cost of facilities, assets and services
2) rental income / revenue from property
3) Cleanliness of facilities and sanitary provisions,
4) Adequacy of security and safety provisions,
5) Regularity of building services,

6) Quality of office equipment,
7) Quality of office layout,
8) Flexible furniture and ambient condition,
9) Comfortable temperature and
10) Adequate ventilation and lighting.

These dimensions were also classified in three categories of indices of Financial, Satisfaction with work environment and comfortable building (Figure 2.10). Each dimension indicated for the two major constructs (effectiveness of FM and building performance) is measured from the several measures indicated under the dimension, such that the final value obtained for each construct is determined by the aggregate of the measured effect of these individual measures (Figure 2.10). Accordingly, the regression equation for the relationship in the framework could be represented by the equation;

$BPV = b_0 + b_1F + b_2QS + b_3CRM + e$

Where BPV = Building performance.

Each independent variable in the above equation represents a group of variables as follows:

F = The financial category;

QS = Quality of service category;

CRM = Crisis response and management category;

$b_0$, $b_1$, $b_2$---bn, are regression coefficients and e is the error term.

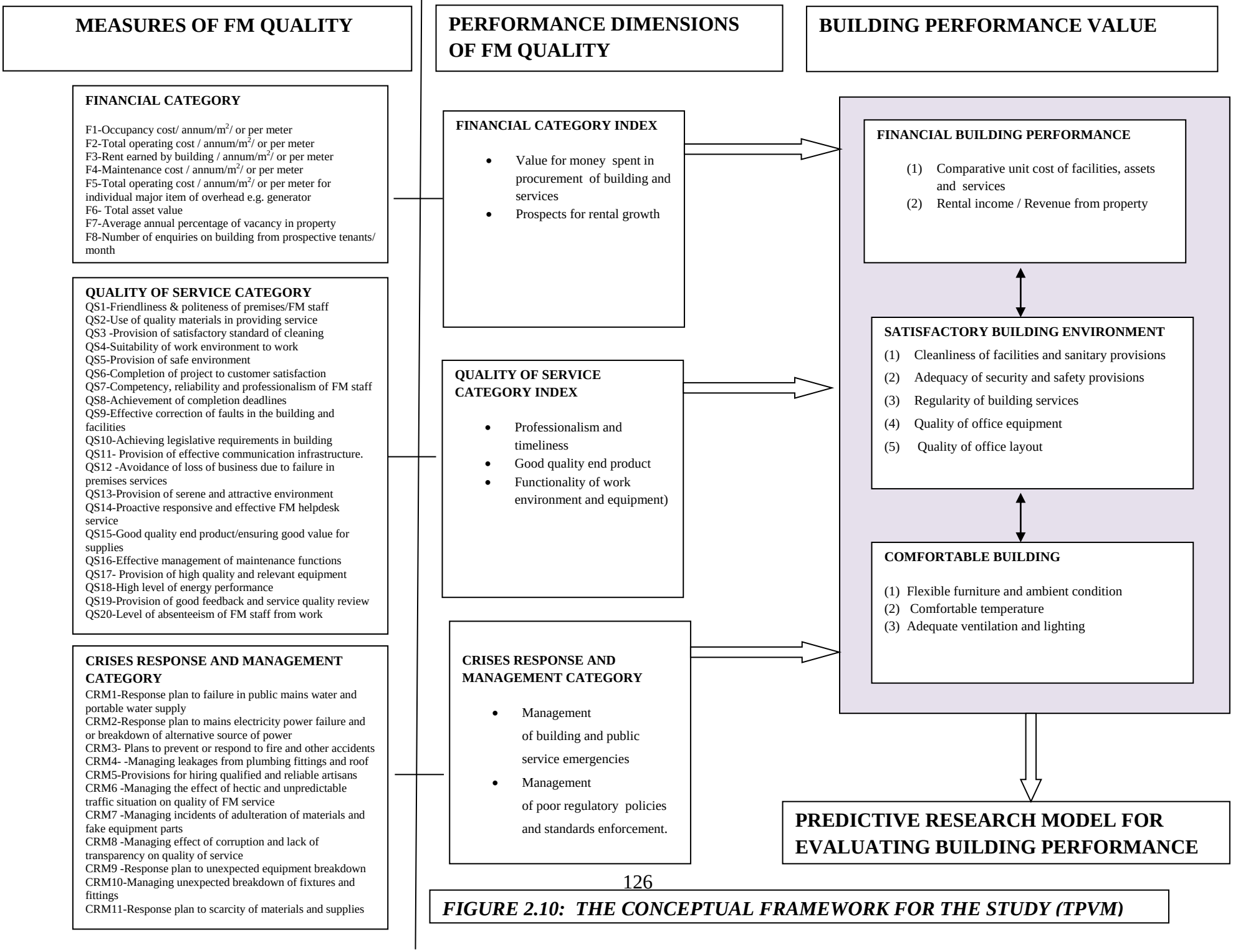





***FIGURE 2.10: THE CONCEPTUAL FRAMEWORK FOR THE STUDY (TPVM)***

***Crises Response and Management - Innovation in this Conceptual Framework***

All the category indices and dimensions that measures the two major constructs in this conceptual framework i.e. effectiveness of FM and building performance were obtained from previous studies on performance measurement except for the dimensions under the Crises response and management category of dimension. This category and its dimensions is an innovation in this research and there is no evidence that the category has been featured in previous studies and frameworks. The crises response and management dimensions were conceptualized into the framework based on the author's belief that they are necessary for the Nigerian situation which is typically fraught with irregularities and the unexpected, invariably resulting in numerous crises. Examples of these situations include electric power outages and dangerous electricity fluctuations that sometimes result in fire outbreaks, shortages of public mains water supply, unpredictable traffic and its associated delay effect (African time) and corruption. Others are poor national standardization policy and enforcement; with associated difficulties in obtaining reliable and standardized equipment/fittings and qualified artisans generally; sometimes outright faking of equipment parts and severe weather (heat and humidity) all of which result in frequent breakdowns of machinery and equipment among others. Therefore, these dimensions were introduced into the conceptual framework of this study in order to capture this aspect of the Nigerian context, in the realization that FM practitioners may be unable to practise successfully in this environment, unless there is adequate provisions and strategies for crisis response and management.

The framework adopts the elementarism approach which measures performance as the sum or average of the performance of the different parts (Simpson and Barrett, 1996). In other words, it used a multiple item scale which provides the performance value for the separate attributes /

measures and thereafter groups of measures. Although it includes measures of strategic FM, the greater percentage of the measures is for operational FM as not all firms have strategic roles for their FM. It means that the framework assumes that the BSS providers in every organization provide some form of FM service, although it is recognized that the real FM practice provide strategic services.

# CHAPTER THREE

# RESEARCH METHOD

## 3.1 INTRODUCTION

This chapter discusses the details of the methods adopted in this research. Typically, the process of research involves initial observation (research questions), theory generation, hypothesis generation, data collection and analysis (Field, 2009). Therefore, this chapter provides information on the methods used at each stage of this research process such as the research design, sampling technique, and size and questionnaire design. It also provides information on data sources, collection procedure and the method adopted in the analysis.

The research was designed to determine the influence of FM service on office building performance. In greater detail, it is designed to identify important measures of effectiveness of FM practice in the Nigerian context and by using the identified measures, determine the relationship between effectiveness of FM and building performance. From the established relationship, the research develops a predictive model that can serve as a veritable tool for measuring the level of performance of office buildings in the Nigerian context. The research also examines the effect of strategic FM on office building performance.

## 3.2 RESEARCH HYPOTHESES

This aspect of the chapter re-states the hypotheses that were postulated to guide the study as provided in the introductory chapter as follows;

1. Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory.

2. There is no significant difference between the performance of office buildings which adopt strategic facilities management principles and office buildings that do not.
3. There is no significant relationship between effectiveness of facility management and office building performance.
4. The effectiveness of facilities management is not a significant predictor of performance of office buildings

.

## 3.3 RESEARCH DESIGN

Research design is the strategy or strategies used in turning research questions into finished projects. Therefore, the design used in a research must consider the purpose of the research, the theory guiding it, the method and the sampling strategy (Robson, 2002). Two major categories of research design exist and these are the fixed and flexible research designs. According to Robson (2002), fixed research design involves a tight pre-specification of data requirement before reaching the data collection stage. It is usually quantitative and comprises both experimental (causal) and non-experimental (survey) type researches and a third type ex-post facto added by Asika (2004). Flexible design evolves during data collection and its data are typically non-numerical. It comprises case-studies, ethnological and grounded theory studies.

Experimental design involves measuring the effect of manipulating the independent variable on the dependent variable, while in surveys the researcher does not attempt to change the situation, circumstances or experience of the participants. Therefore, this research adopts the fixed design survey type of research because the data requirements are pre-specified before collection and also because a manipulation of the phenomena to be measured is not required.

Rather what is needed is an exploratory study of what naturally exists. Survey designs can be further categorized into Relational, Comparative and longitudinal designs (Robson, 2002). Relational design attempts to establish the relationship between variables. The main focus of comparative designs is to analyse differences between groups, while longitudinal designs involve repeated measures of the same variable over an extended period of time in order to obtain a trend over this period. Hence this research adopts the relational survey type of design.

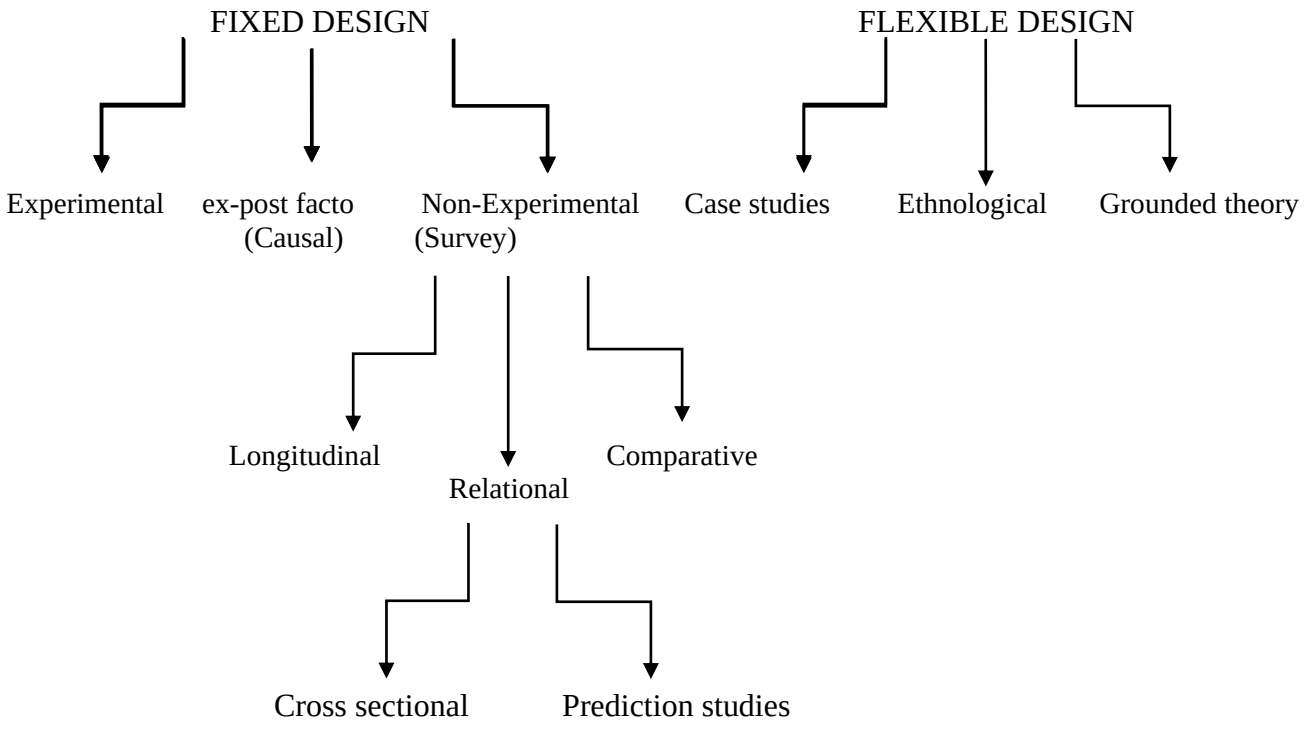



***Figure 3.1: Classification of Research Designs***

Relational designs are further divided into cross sectional and predictive studies. Predictive design attempt to predict scores of one variable from another, but the study has to extend over time to test the prediction. Cross sectional design obtains all measures within a short period of

time and is probably the most widely used survey type of design. In view of the shortness of the time available for the collection of the data for this research it adopts the Cross sectional, relational design type. This research depicts the various design classes and their interrelationships in Figure 3.1.

In summary, this study adopts a fixed design survey using a relational, cross sectional, style. This is because this is the most suitable approach where the intention of the study is to obtain information from the field for analysis, as is the case with this research. In most cases a survey will aim to obtain information from a representative selection of the population and will be able to present a finding from this sample that will be representative of the population as a whole (Bell, 1999). Some advantages of simple survey are its transparency and accountability (Hakim, 1987). It is also recognized for its high degree of standardization. A simple survey provides large amounts of data at a relatively low cost and within a short period of time (Robson, 2002) and may well be the most influential of all forms of usable knowledge (Cohen, 1979). These features of cross sectional survey research have made it quite popular among researchers including those in the subject area of this study. Such past studies where this design have been used include; Apgar (1995), Simpson and Barret (1996), Atkin and Brooks (2000), Ho *et al.* (2000), Leaman and Bordass (2001), Brackertz and Kenley (2002), Clark *et al* (2003), Lindholm and Levainen (2006), Moss *et al*, (2007), Durodola (2008), VanMossel (2008), Lavy *et al*. (2010) and Bryne (2011). This popularity of the survey design in addition to other important reasons earlier stated, guided the choice of the use of survey design in this study.

## 3.4 STUDY AREA

This study is limited to metropolitan Lagos. Lagos State is a narrow coastal flood plain of Bight of Benin. It is located in the South-Western part of Nigeria and lies approximately on Longitude 20 $42^0$ E, 3 $22^0$ E and Latitude 600 $22^0$ N. It is bounded to the North and East by Ogun state, West by Republic of Benin and to the South by the Atlantic Ocean (Lagos State Government 2011). The state comprises five (5) administrative divisions i.e. Badagry, Epe, Ikeja, Ikorodu and Lagos Island. These five (5) divisions are constituted into 20 local government areas out of which 16 makes up Lagos metropolis. In other words, two of the administrative divisions i.e. Ikeja and Lagos Island which make up metropolitan Lagos are further sub-divided into 16 local government areas. Hence, four (4) local government areas i.e. Badagry, Epe, Ibeji-Lekki and Ikorodu local government areas are beyond Lagos metropolis (Lagos State Government, 2011).

Lagos metropolis is Nigeria's financial, commercial and industrial nerve centre and accounts for 40% of the labour emoluments paid in Nigeria. It harbours the headquarters of many multinational companies, 60% of the federation's industrial investment and foreign trade and attracts 65% of Nigeria's commercial activities (Lagos State Government, 2011). Lagos metropolis harbours over 2,000 manufacturing organizations and over 200 financial institutions, including the nation's premier Stock Exchange. It is also where the nation's monetary authorities such as the Central Bank and Security and Exchange Commission are located. Furthermore, 23 out of the 25 banking institutions in Nigeria have their head/regional offices within Lagos metropolis (Lagos State Government 2011). It is in view of the foregoing that Lagos metropolis was adopted as a study area for this research. Presumably, any demonstrable value adding edge of FM can be better observed within Lagos metropolis, in

view of the relatively high concentration of offices and the opportunity it offers for FM and BSS practice generally. It is also presumed that findings from this study area can provide a veritable guide for other parts of the country.

## 3.5 STUDY POPULATION

In research, population does not necessarily refer to a body of people, it refers to all cases or situations that a researcher wants to make inferences about (Rowntree, 2000). Population is an aggregation of all elements that share a common characteristic (Asika, 2004). Therefore, two sets of population were identified and used in this study. The first one comprises all users (occupiers) of purpose-built office buildings in Lagos metropolis which possesses some certain characteristics, while the second consists of all building support service providers (traditional BSS providers and facilities managers) in the same group of buildings. The required characteristics include;

1) The existence of a well-established building support service and
2) Absence of major building renovations that could disrupt services to users at the time of this study.

Lastly, the support service providers in the buildings must have remained unchanged in the last one year and should also not be in the process of a change. It is expected that the peculiarities of this group of buildings will make a well performing office building and effective FM process easily discernible. Also, defining the population of this research from the group of buildings that met the requirements earlier stated is in an attempt to generate the sample from a homogeneous population with as little variability as possible (McQueen and Knusson, 1999, cited in Adenuga 2008). Moreover, it is presumed that using respondents in

this group of buildings will minimize inaccuracies in responses and will also minimize the number of unanswerable questions thereby reducing missing values.

## 3.6 SAMPLE SIZE

It is important for the sample size for a research to be adequate and a true representative of the population, otherwise it may not be possible to generalize the findings of such studies beyond the sample, that is, it may not be possible to generalize the findings to the population. The use of appropriate sample size reduces the probability of an alpha error, finding a difference where there is none and beta error, failing to find a difference where real differences exist (Bartlett, Kotrlik and Higgins, 2001).

According to the information gathered from the BSS providers in the 41 buildings that met the criteria discussed earlier, the target populations of respondents are approximately 10,540 users / occupiers and 412 building support service providers / facilities managers. Curry (n.d.) cited in Yount (2006) recommended the use of a sample size of 3% of the target population, for a population range of between 5001 and 10,000. Djebani and Al-Abed (2000) used a sample size of 180 for a target population of 5,240, which represents 2.4%. Similarly Arshad and Ameen (2010) used a sample size 390 for a target population of 16,050 which represents 3.4%. Hence, this research used a sample size of 369 representing 3.5% of the target population for the building users' sample. This is considered adequate because it is more than the range recommended by Curry (n.d.) cited in Yount (2006) and the proportions used by the two authors cited above.

Curry (n.d.) cited in Yount (2006) recommended a 10% proportion as sample size for a target population range of 101-1,000 which is the range within which the BSS providers target population of 412 falls. Similarly, Adejumobi (2011) used 10% of target population as sample size in her work on teacher's performance. However, this proportion was increased to 30% for the purpose of this study in the realisation that 10% will amount to an approximate sample size of 41 which is equivalent to just 1 respondent per building. At the pilot study stage where two (BSS provider) respondents were used per building, there were a few instances where data were not available at all for particular buildings because both respondents failed to provide a response. This could introduce bias into the study. Therefore it was decided that the proportion should be tripled to 30% in order to reduce the probability of not having data on a particular building from the BSS providers from 50% to about 12.5%, which is preferable.

## 3.7 SAMPLING TECHNIQUE

A sample is any part of a population selected for participation in a study and that has the features of the population. The sampling for the building users was done using multi-staged sampling. At the first stage stratified sampling method was used to divide the 369 respondents equally into the 41 different strata, whereby each building constitutes a stratum. This amounted to 9 respondents per building. At the second stage, stratified sampling was again used for the buildings that housed more than one organisation. In this case, each organisation constituted a sub-stratum. This provides equal opportunity for the views of staff in the various organisations housed in the building to be represented. Simple random sampling through a random number generator (StatTrek, 2010) was used to select the nine (9) respondents in the case of buildings that are occupied by a single organisation.

The sampling for the BSS providers was also multi-staged. Stratified sampling method was used at the first stage to divide the 123 respondents equally across the 41 buildings; this amounted to 3 respondents per building. Simple random sampling was used at the second stage to select the respondents in the BSS department of each building.

To fulfil the third objective of this research which involves a comparative study of performance value of buildings where strategic FM principles are adopted and those where these principles are not adopted, there was a need to separate between the sample of respondents who occupy buildings where strategic FM is applied from those where non-strategic FM or other BSS practices are adopted. This separation was done on the basis of information provided on how strategic or not the nature and scope of the BSS practice provided in each building is. It is understood that this method could import bias into the study, but the other two available options could bring in even greater bias and probably reduce the real value of this study. These options are to conclude that a BSS provider adopts strategic FM principles on the face of his claims or secondly to assume that if a practitioner is a member of IFMA Nigeria he or she must adopt strategic FM principles.

## 3.8 DATA SOURCES

The data for this research were collected from primary sources using self-administered survey questionnaires. Research surveys is recommended for gathering information in the area of corporate real estate performance measurement, particularly where data is required from a large number of people and when it is impractical to meet them all face-to-face (Lindholm and Nanonen, 2006). Sarshar and Pitt (2009) and Preiser and Nasar (2008) both identified two major perspectives in a survey as that of users (comprising both the building occupiers and

staff of FM department) and that of expert assessors. The perspectives of experts may provide an objective measure particularly where the assessor is experienced but the resulting assessment is usually in the form of an audit (i.e. what is provided and what is not provided), rather than an assessment of performance (McDougall *et al.*, 2002). In addition, expert analysis is not totally without bias and it may be difficult for experts to score the measures against organization objectives because they do not use the building in a productive process like the consumers do. Hence, to avoid the limitation posed by the possible bias, cost and time of use of expert assessors and also because there is a shortage of expert building performance assessors in Nigeria, this research adopts the user's perspective. Perception study is a real world approach to data collection that affords proximate, inexpensive and available sources of data that can be examined on a case by case basis (McDougal *et al*., 2002).

Sarshar and Pitt (2009) explained that the consumers' perspective is preferable as it is influenced by core side strategic performance requirements. Also, consumer's scoring is less influenced by job security interests unlike staff of the FM unit who could worry about the prospect of a job loss if they admit to their employer's poor performance. The major limitation of the customer perspective is the issue of subjectivity of the consumers' views. However, this limitation can easily be overlooked in view of the advantages. User based survey has been used in FM performance studies such as, Preiser (1995), Leifer (1998), Hinks and McNay (1999), Leaman and Bordass (2001), McDougall *et al*. (2002), and Rogers (2003). Others are Pickard (2006), Warren (2006), Meulenbroek (2008) and Tucker and Pitt (2008). Guided by all of the above, this study adopts user's perspective.

Hinks and McNay, (1999) recognized that both customer satisfaction, and internal business processes are important within the context of consumer based performance measurement and that both the customer and premises staff are important in assessments involving these two constructs. Sarshar and Pitt (2009) explained that for those aspects of performance that may not be visible to building users the researcher may have to contend with either the views of the FM staff or that of the external parties. Although, the views of the external party may be preferable to avoid bias in the above situation yet it may be necessary to use the views of the FM staff because of protocols and the cost of using external parties. In view of this the current study used the building occupants' perspectives generally except in the case of financial performance where the FM staffs' perspectives were used because it is presumed that this area is less visible to the users. Building performance was measured from the ratings provided by the users of the building who due to their sustained stay in the building (at least for one year) are able to observe and rate the various building attributes.

Performance evaluation studies that are based on consumer perspectives can be accomplished through one of four approaches, i.e. verbal scales or questionnaire scores, observation of use, interview with a focus group and archival records (Preiser and Nasar, 2008). Archival records could provide useful information but it is usually in the form of lagging records of what has been or is available rather than a perception of performance. Some of the major difficulties with interview and observation are bias, high cost and the difficulties of getting the cooperation of respondents. Unless observation is done over a reasonable length of time there could be significant bias in the findings. This type of close observation requires collaboration with the client organization in a case study and is often difficult to obtain in the Nigerian situation where there seems to be a significant aversion to research. Interviews could increase

response rate and could allow for clarification but they could also be time consuming and subjective (Bell, 1999). This research used the first of the four methods i.e. a questionnaire score of various measures using the perspectives of building users that are permanent office staff and have used the building for at least 12 months. This is in view of the limitations of archival records, observation and interview methods as earlier identified. However, where required, particularly for clarification on the information provided in the questionnaire triangulation with face to face and telephone interviews were used. For example at the pilot study stage, interview with focus groups and experts in FM was used to identify the measures to be included in the questionnaire for the final study, while telephone interview was used, for clarification on the survey responses particularly on the aspect of strategic FM practice. Direct observation was also used but mainly to view the buildings in the sample and to help set the data provided by respondents in proper perspective. No attempt was made at scoring the measures / variables through observation so as to minimize personal biases of the researcher, particularly as the ratings in this survey are to be based on how the variables affect the user's condition and productivity.

Three major views could be used in typical customer perception survey as follows; view of individuals on the contribution of various attributes of their workplace to productivity, views on the importance of various building attributes and thirdly views on user satisfaction with workplace and building (Clark *et al*., 2004). In order to fulfil the objectives of this current study all three views were used. The questionnaires measured performance from the perspective of the respondents rather than carry out a gap study as an alternative. This is because writers such as Cronin and Taylor (1992); Simpson and Barett (1996) and Lee (2006) to mention a few, have all found out that the gap measure, in spite of the greater difficulty

accompanying its use, is not necessarily more reliable than a perception study. A gap study is one that requires respondents to indicate in their opinion how wide the difference between the perception of service quality and expected performance quality is.

Secondary data sources such as journal articles, conference proceedings and papers as well as textbooks were used to identify theories and provide material for review of existing theoretical frameworks while paving grounds for the development of the conceptual framework that was used in this research. The reviews also indicated important measures and dimension of performance measurement in FM.

## 3.9 THE RESEARCH INSTRUMENT

It was stated earlier that this study adopted questionnaire scores in a user perception survey. Therefore the major research instrument is the questionnaire. Two sets of questionnaires were designed and used in order to elicit responses to questions on aspects of the entire research problems. The first questionnaire was designed to elicit responses from occupiers of the building sample. The questionnaire was divided into three parts A, B and C. Part A explored the characteristics of the respondents such as age, gender, highest academic qualification, and work designation within the company. Part B contains questions on the scoring of non-financial measures of effectiveness of BSS provisions (based on level of their importance). Part C measures the current performance levels of the buildings as well as the level of effectiveness of the FM provisions. The second (provider's) questionnaire was equally divided into three parts. Part A explores respondents' background information as with the first questionnaire, including their professional qualification and how long they have been in charge of the respective building. Part B contains questions that involve scoring the financial

measures of effectiveness of FM provision based on the level of their importance. Part C is divided into two sections which measures the BSS provider's perception of their financial effectiveness as well as the financial performance of the buildings in the study. The questions addressing the financial measures and performance were included in the providers questionnaire because it is presumed that this group of respondents are those that will have financial information.

Questions in the background information sections are mostly categorical. Most others apart from the financial performance questions are in the scale form. This group of questions used a five point scale which assumes an interval scale. That is, the scale assumes that scoring is made on a continuum, such that the difference between a score of 2 and 3 is exactly the same as the difference between 4 and 5. The financial performance questions are in ratio scale. Building performance was measured using both the hard (financial) measures and soft measures of comfort and satisfaction. Comfort is measured from dimensions as temperature, air quality, lighting, and others such as privacy, spatial comfort etc. and satisfaction from productivity, design quality and health. Effectiveness of FM was measured from dimensions as timeliness of service, quality and range of service (Amaratunga *et al.,* 2000) and Nigerian specific dimensions as building and public service emergencies and poor regulatory policies and standards enforcement. Further details on the variables that were used in measuring effectivenss of FM and building performance are provided in the next section.

## 3.10 DATA REQUIREMENT & VARIABLES

The First objective identifies important measures of effectiveness of facilities management provisions in office buildings in Lagos Metropolis. It featured 42 measures, out of which eight

(8) are in the financial category, 22 in the quality of service category and 12 are in the crises response and management category. For objective one Building users were required to rate the soft measures on a scale of 1-5 depending on how important each measure is in the evaluation of the effectiveness of their FM service providers towards making them productive in their work environment. The interpretation of the rating is as follows: not important (1), hardly important (2), somewhat important (3), important (4) and very important (5). For the financial data, the building support service providers were required to provide the appropriate sum (unit cost) in the form of a ratio scale. The applicable question for the financial measures of effectiveness of FM in the questionnaire is question 17 of the BSS providers' questionnaire while the appropriate question for the non-financial performance data is question 10 of the user questionnaire.

Objective two evaluates the level of performance of office buildings in Lagos metropolis. For the non-financial data building users were required to rate the buildings based on how satisfactory the important building attributes are, particularly in terms of how it affects the users' productivity in their work environment, It featured 45 variables in the non-financial category made up of 18 measures in the comfort category and another 27 in the satisfaction category. The questions also used a 5-point scale that assumes an interval represented as follows; (1) not satisfactory, (2) is less satisfactory, (3) somewhat satisfactory, (4) satisfactory and (5) very satisfactory. Again the financial performance data (10 variables) were required to be provided by the BSS providers as financial sums (unit cost) as appropriate in the form of a ratio scale. The appropriate question for the financial measures of building performance in the questionnaire is question 19 of the BSS providers' questionnaire, while for the non-financial data the appropriate question is 11 of the user questionnaire. Objective three also relates to the

performance of the office buildings in the study. Therefore it uses the same set of variables and question as in objective two

Objectives four and five are relational analysis. They relate effectiveness of FM to building performance. While objective four indicates the nature of the relationship between the two constructs, objective five attempts to develop a predictive model from this relationship. The building performance information required in objectives four and five are the same as those required in objective two. The data on effectiveness of FM uses the same variables and scales as in objective one but rather than scoring the variables in terms of their importance as with objective one, the scoring of the measures is based on users' satisfaction with the service. The appropriate question for this is question 12 of the user's questionnaire. The data obtained from this and those obtained for building performance in objective two provides the data required for the comparative analysis in objectives four and five

## 3.11 DATA COLLECTION PROCEDURE

The questionnaires used in gathering the data for this dissertation were administered and retrieved personally by the researcher with the aid of trained field assistants and three supervisors. The field assistants are all undergraduates of the University of Lagos. The assistants and supervisors were trained in two different sessions, the second one consolidating on the first and also providing clarifications on issues that arose from the previous training.

The data were collected between September, 2010 and June, 2011. Although as at March, 2011 most of the data were already in. However, a few others were being awaited till June, 2011 particularly those on companies having organizational processes that require detailed

international protocol for data disclosure e.g. oil industry. Respondents in some of the organizations will not cooperate until there was a formal approval from the international group corporate operations head (usually stationed somewhere in Europe). Incidentally this research places a lot of importance on this category of responses in view of the globalised nature of FM practice in the oil industry. This industry is arguably where most of the Nigerian BSS practitioners that adopt strategic FM principles practice. As a result, the full data analysis could not commence till June when most of the expected responses from this industry had come in.

## 3.12 DATA MEASUREMENT METHOD AND VARIABLES SPECIFICATION

User perception surveys could be ordered or unordered e.g. satisfaction and emotion respectively (Field, 2009). This research used ordered perception survey. Data measurement could be classified as categorical or continuous. A categorical data measures variables in categories. It measures variables as entities with distinct names and utilizes non extensive arithmetic calculations such as frequencies and percentages in the analysis. Examples are sex, religious affiliation, ethnicity, etc. In its simplest form, it comprises just two classes (two point scale) known as binary variable and where there are more than two, it is referred to as nominal data. Categorical data can be ordered, in which case they are referred to as ordinal data where the events have occurred in a certain order. Hence, ordinal data provides more information than nominal data but does not indicate the difference between the values in the order or scale. Garson (2010) distinguishes between an ordinal index and ordinal scale. In ordinal index, individual likert type item are used while ordinal scale involves summation of scores from selected ordinal items which have been shown to measure a single dimension. Ordinal scales and not index were used in fulfilling the objectives of this research. Ordinal index were used

only for the background information of the respondents. Ordinal scales are normally treated as interval data while ordinal index are treated as ordinal data.

Continuous data gives a score to each value and can take any value on the measurement scale (Field, 2009). It comprises two classes i.e. the interval and ratio scale. Interval scale measures values with a precise interval of exactly the same size, e.g., the value difference between a score of 2 and 3 is exactly same as the one between a score of 5 and 6. A ratio scale is an interval scale that has an absolute 0 (zero) value and has ratio values along the scale that are meaningful (Dettwiler, 2006). The financial data in this research took the form of ratio scale.

Likert scale type measurement is common with survey which are consistently used to measure quality (Allen and Seaman, 2007). In this realization, the data for this research used categorical, measure in the form of a 5 point likert scale without a neutral point i.e. the middle point of the scale (the score of 3) has a real value and not a neutral value. It is important to recognize that in the current research, measurement involves the scoring of dimensions (attitude or attribute) on a continuum such that a score of 2 is presumed to be a unit value better than a score of 1, while a score of 3 is a unit value less satisfactory than a score of 4. Hence, the measurement although in an ordinal form assumes an interval scale.

The variables that were used in this study were obtained from literature (Cohen *et al*., 2000; Hinks and Macnay, 1999; Davies and Walters, 2000; Oselland and Willis, 2000; Cohen *et al*., 2001; Leaman and Bordass, 2001; Shaw and Haynes, 2004; Lindholm and Leväinen, 2006 and Pickard, 2006). However, their relevance to the study area was improved upon through interview with 8 (eight) experts in the field and by presenting it to a focus group of Ph.D.

candidates in the construction industry for reviews and criticism. This approach helped to identify some other contextual variables that were not included in literature and excluded others that were considered irrelevant to the Nigerian office building users. The approach also indicated where there is a need to rephrase some of the terminologies to make them more comprehensible for respondents in the study. The use of focus groups to identify contextual measures to include in performance measurements has been used often by researchers in FM studies such as Walker and Baker (2000), Amaratunga *et al.* (2000) and Shaw and Haynes (2004) to mention a few. The "response to crises variables (being a unique creation of this study) were obtained mostly from the researcher's line of thought, interviews with the experts, the focus group and a few variables indicated under risk factors by previous authors.

The conceptual Model has component parts that can be used in measuring building performance on the one hand and effectiveness of FM service on the other and how these two relate to each other. The next section includes the variables that were used in the measurement of effectiveness of FM and building performance respectively (see questionnaires in appendices 1 and 2).

### 3.12.1 Building Performance Component

This has three major category indices of performance measurement of Financial, Satisfactory work environment and Comfortable work environment. The satisfaction category was measured from two perspectives i.e. satisfaction with facilities and satisfaction with environment; Financial from value for the cost of operating the buildings and facilities and the income or revenue from the property, while comfort was measured from the physical comfort

of the buildings and environment. The following are the list of measures or variables under each category as in the questionnaire. The letter V is used to represent variables.

***Financial Performance Indices***

V1) Total annual operating cost of building

V2) Total number of employees in the building

V3) Total annual occupancy cost

V4) Total annual maintenance cost

V5) Total asset value

V6) Annual rent earned by building

V7) Annual increase in rent

V8) Average number of enquiries for space in building by prospective tenants per month

V9) Total gross floor area of building in metre square

V10)Total operating cost for individual major overhead items such as power, electricity generator, cleaning, ICT/communication and waste disposal.

***Non-Financial Performance Indices (Satisfaction with work environment)***

V11) Safety of placement of electric sockets and switches

V12) Convenience and privacy of location of telephone points within the building

V13) Adequacy of location and placement of fire alarm, extinguisher, smoke detectors and other fire safety fittings and equipment

V14) Adequacy of fire prevention provisions

V15) Adequacy of location of office equipment such as computers, printers, copiers, software etc.

V16) Efficiency of office circulation, movement space and layout

V17) Quality of furniture and fittings

V18) Quality of office equipment

V19) Adequacy of size of each office in relation to the work going on inside it

V20) Efficiency of the location of an office space in relation to other offices within the department

V21) Overall suitability of building to organisational needs

V22) Level of office privacy and protection from internal and external distractions

V23) Level of office hygiene

V24) Adequacy and efficiency of car parking provisions

V25) Adequacy of signage and direction provisions (indicators to toilets, offices, lifts, fire exits etc.)

V26) Safety and security of doors and gates

V27) Adequacy of anti-theft and burglary provisions

V28) Quality of lifts and adequacy of its safety provisions e.g. emergency stop, excess weight indicator

V29) Efficiency and adequacy of first aid provisions e.g. building apparatus

V30) Efficiency of waste management facilities

V31) Efficiency of mains electric power and emergency power provisions

V32) Adequacy and convenience of water supply sources

V33) Efficiency of workroom, if this is different from private offices

V34) Adequacy of staff personal storage space e.g. drawers, book cabinets, particularly for general office

V35) Adequacy of building health, safety and other emergency provisions

V36) Adequacy of overall building security provision

V37) Adequacy of overall accident prevention provisions

***Non-Financial Performance Indices (Comfortable Work Environment)***

V38) Convenience of placement of electric power sockets and switches

V39) Flexibility of position of furniture, fittings and equipment to suit users' needs

V40) Comfort of the furniture e.g. height of desk to seat, backrest, etc.

V41) Quality of natural lighting

V42) Flexibility of electric lighting to suit ambient conditions

V43) Adequacy and freshness of natural ventilation e.g. adequate positioning of doors and windows

V44) Comfort of lifts, elevators and escalators e.g. adequate ventilation, sufficient interior space

V45) Comfort and cleanliness of canteen and eating facilities

V46) Comfort and cleanliness of sanitary facilities and toilets

V47) Natural temperature comfort within the building (Hot or cold)

V48) Quality of humidity control provision

V49) Comfort and efficiency of air-conditioning systems

V50) Comfort and efficiency of sun glare prevention mechanism

V51) Efficiency of internal noise prevention mechanism (people, AC, photocopiers, printers, etc.)

V52) Efficiency of external noise prevention mechanism (generator, car hooting, social and religious functions, vehicles, construction, etc.)

V53) Flexibility of automated equipment control to suit needs (AC, doors, window blind)

V54) Ease of retrieving stored work materials and records from archive

V55) Prevention of damping and moulding during the raining season

### 3.12.2 Effectiveness of FM Variables

Forty two variables were presented to respondents to enable them identify the key measures for FM effectiveness. These variables were classified into three major category indices of Financial, Quality of service and crises response and management. The following are the list of measures or variables under each category.

The crises response and management category are to be rated on the extent to which provisions are in place to minimise effect of these crises and uncertainties and how effective these interventions have been when required. Interventions such as creation of safety committees, fire drills and evacuation procedures to prepare for fire occurences, intermission power supply pending the time it takes to change between electric power sources, ability to put in place a structure that ensures access to genuine artisans and sources of material supplies etc. To what extent are resources made available to enhance the efficiency of these intervantions and how well the property manager has been able to make every problem everybody's. In buildings where these crises have never taken place how effectively have they been prevented.

***Financial Performance Indices***

V1) Occupancy cost per annum, square foot or metre,

V2) Total asset value

V3) Total Operating cost per annum, square foot or meter

V4) Maintenance cost per square foot or meter

V5) Rent earned by building per square metre

V6) Total operating cost of individual major item as generator

V7) Average annual percentage of vacancy in property (demand)

V8) The number of prospective tenants who show interest in renting a space in the building per month or year.

***Non-Financial Performance Indices* (*Quality of service)***

V9) Avoidance of loss of business due to failure in premises services

V10) Satisfaction with facilities and physical working condition

V11) Provision of safe environment

V12) Provision of serene and attractive environment

V13) Customer satisfaction with facilities

V14) Suitability of building, fittings and environment to work

V15) Provision of relevant and high quality equipment

V16) Effectiveness of communication provisions and management of information

V17) Reliability of building support services

V18) Effective and proactive complaint / helpdesk

V19) High level competence and professional approach of premises staff

V20) Friendly and courteous premises staff

V21) Responsiveness of FM department

V22) Effective management of maintenance functions

V23) Level of absenteeism of FM / premises staff

V24) Satisfactory standard of cleaning

V25) Completion of works i.e. repairs improvement and maintenance to customer requirement and time deadlines

V26) Good quality end product and ensuring value for work done by suppliers

V27) Use of quality materials in providing service

V28) Ability to meet legislative requirement in building

V29) High level of energy performance i.e. effective, steady and cheap electricity

V30) Effective and timely correction of faults

***Non-Financial Performance Indices* (*Crises response and management)***

V31) Response plan to mains electric power outage and or breakdown of alternative source of power

V32) Response plan to failure in Public mains water and potable water supply

V33) Managing incidents of adulteration and fake equipment and spare parts

V34) Response plan to scarcity of required items e.g. fuel or spare parts

V35) provision for hiring qualified and efficient artisans

V36) Managing effect of hectic and unpredictable traffic situation on quality of service

V37) Prevention of fire accidents and health emergencies

V38) Plan of action in case there is fire accidents and health emergencies in the buildings

V39) Managing effect of corruption and lack of transparency on quality of your service

V40) Managing unexpected breakdown of equipment (computer or air conditioner etc.) as a result of electricity current fluctuations

V41) Managing effect of unexpected breakdown of fixtures and fittings e.g. toilet fittings, lifts

V42) Managing leakages; plumbing fittings and roof

## 3.13 METHOD OF DATA ANALYSIS

***Justification for Use of Parametric Analysis with Likert Scale Data***

Statisticians such as Robson (2002) and Field (2009) indicate that while parametric methods such as mean, standard deviation, ANOVA, student's t test, regression and factorization can be used for interval scale data, only non-parametric methods such as frequencies, percentages, chi-square, Wilkinson rank test, Kruskal-Walis etc. are relevant for ordinal data. The implication of this is that where an ordinal data assumes an interval scale as is the case with this current study, it can then be analysed using parametric analysis methods. It is recognized that there are controversies surrounding the statistical processing of ordinal scale as interval data. However, numerous authors argue that although Likert scale is ordinal, its use in statistical procedures assumes an interval scale because of the presumption of the existence of an underlying continuous variable whose value characterizes the respondent's attitude and opinion; provided, the scale has at least 5 points and the middle point (for odd number scales) represents middle level response and not a neutral response (Schact, 2005; Narli, 2010; Allen and Seaman, 2007; Field, 2009; and Garson, 2010). Furthermore, authors argue that the initial presumption of the Likert scale when it was created in the 1970s is that it has an underlying latent continuous variable which gives it the characteristics of an interval data (Allen and Seaman, 2007 and Norma, 2010).

In spite of the above arguments some authors warn about the need to exercise utmost care when treating likert scale as interval data. Jamieson (2004) advised that where the data being analysed is clearly ordinal (ordinal index) then ordinal data analysis method should be used. He also explained that the size and normality of the distribution should also be considered in the choice of analysis method. Clason and Dormody (1994) explained that ordinal

measurement scale should be taken as interval only where it is possible to measure the latent variable directly. Similarly Allen and Seaman (2007) stated that where ordinal data has to be treated as interval data, the values of the dataset and the objectives of the analysis must be examined, otherwise results can be misleading. However, in an interesting twist Norma (2010) attempted to demystify some of the established rules about use of Likert scale and parametric tests when he found very insignificant differences in the values obtained from an empirical investigation where both parametric and non-parametric statistics were used for same likert scale based data under normal and non-normal sample distribution scenarios. Norma (2010) therefore concluded that parametric statistics are robust enough to be used with Likert scale data even with small sample sizes, unequal variances and non-normal sampling distribution, without the fear of coming to the wrong conclusions.

This study used ordinal scale and not ordinal index. The ordinal scale assumes underlying dimensions in a continuum and presumes that the space value between a score of 1 and 2 is exactly the same as that between a score of 4 and 5. The scale makes it possible to measure the latent variable and its interval as an attribute of the data rather than labels (Allen and Seaman, 2007). In addition, the distribution of data for this research is normal. For these reasons the data in this research are treated as interval data. Hence parametric analyses were used in their analysis. Furthermore, Likert scale has been analysed by many researchers in the subject area with different combinations of parametric analysis ranging from mean, standard deviation, factor analysis, multiple correlation to regression analysis. Examples of such researches are Douglass (1996), Bottom (1998) Leifer (1998), Leaman and Bordass (2001), Clark and Price (2002), Rogers (2003), Pinder, (2003), Clark *et al*. (2004) and Ho *et al.* (2004). Others are Shaw and Haynes (2004), Pickard (2006), Warren (2006), Meulenbroek (2008), Ahadzie,

Proverbs and Olomolaiye (2008), Lavy *et al.* (2010) and Bryne (2011). All of the above provided the essential reasons for the use of parametric test for ordinal likert scale data in the analysis for this study. The details on the method of analysis used with each objective and hypothesis are discussed next.

***Data Analysis***

The responses that were obtained were coded and analysed using Statistical Package for Social Scientists (SPSS version 17). The justification for the use of parametric statistics for the main objectives has been provided earlier. In summary, descriptive statistics such as frequencies, percentages, mean score, composite mean, etc. were used to summarize and describe the data, while inferential statistics were used in making predictions towards the hypotheses. Such statistical analysis includes ANOVA, multiple correlation coefficients, factor analysis and multiple regression analysis. Significance test in the form of Wilcoxon sign rank test was used for the comparative study on performance between strategic and non- strategic FM managed buildings. Frequencies and percentages were used to analyse the background information of the respondents.

Objective one identifies important measures of effectiveness of FM. The objective was fulfilled by choosing all variables that met the adopted criterion for inclusion in the list of measures. This criterion is an average importance rating of 3.5, which is midway between "somewhat important" (a score of 3) and" important" (a score of 4).

In view of this the data on it were analysed using descriptive statistics such as mean, standard deviation and ranking. The mean score and standard deviation for the level of importance of

each variable as rated by the respondents was calculated. The mean values indicated the variables that should be removed from the scale if any based on the criterion discussed earlier. It also made it possible to determine the attributes that fall within the important category (with a mean score of 4 and above), those in the hardly important category, and those in the not important category. Thereafter, the variables were ranked in a descending order, using these mean values. The ranks made the most important variables and the less important ones readily discernible. The standard deviation indicates the level of agreement for the rating of each variable by the respondents.

Objective two evaluates the performance of offices buildings within the study area. Building performance was obtained from the aggregate performance of several attributes of building performance. Therefore as with objective one, it used descriptive statistics such as mean, standard deviation and ranking. The mean score and standard deviation for the performance of each variable was calculated from the respondents' scoring. Thereafter, the attributes of the building (variables) were ranked in descending order using the mean values obtained. The overall mean value and standard deviation of performance for all attributes and all buildings was also evaluated. These indicated the general level of performance of office buildings within the study area and the level of agreement on this rating by all respondents. It also indicated building attributes that are performing satisfactorily and those that need special attention. The relevant hypothesis i.e. hypothesis one (Office buildings in Lagos metropolis do not perform significantly less than satisfactorily) was tested by comparing the average performance value for all buildings with the hypothesized population mean value (score for satisfactory performance) which is 4. The hypothesis was tested using one sample student t test (single

tail) to determine if the average building performance value is significantly lower than this hypothesized mean value.

Objective three evaluates the comparative performance of office buildings which adopt strategic facilities management principles and buildings that adopt other traditional building support service principles. To analyse the data for this objective the scoring of respondents on building performance were separated into two groups i.e. those of respondents in buildings where strategic FM principles are being applied and those where they are not. The data were analysed using mean score for each variable. The aggregated mean score was then obtained for each variable for all the strategic FM managed buildings separately from the non-strategic FM managed ones. The two sets of mean values were then compared. The relevant hypothesis (two), was tested for significant difference between the two sets of mean values using Wilcoxon rank signed test a non-parametric alternative to paired sample t test which is acclaimed for its better prediction for the context of the data in this study, particularly in view of the sample size of the strategic managed FM buildings Buchanan (2010) and Lowry (2011). It is presumed that a positive significant difference of the mean value of the strategic FM managed properties over then non-strategic managed ones will be accounted for by the effect of FM.

Objective four determines the relationship between level of effectiveness of FM and building performance value. Therefore it analysed data on effectiveness of FM as the independent variable and building performance value as the dependent variable. Data on the dependent variable i.e. building performance value was already available from objective two. For the independent variable, descriptive statistics (mean, standard deviation and ranking) was used to

analyse the scorings of the FM effectiveness variables by the respondents. Thereafter correlation analysis was used to establish the nature of the relationship between the two constructs i.e. the dependent and independent variables.

Field (2009) advised against correlation of too many independent variables with the dependent variables in order to obtain meaningful results. Therefore, the analysis adopted a data reduction technique i.e. exploratory factor analysis to reduce the independent variables to few important factors that represent the underlying latent dimensions of the set of independent variables. In addition, factor analysis identifies the latent variables that contribute to the FM effectiveness construct and also aids the validation of the scale that was developed in this study in objective one by removing measures with low communality (less than 0.4) from the scale, if any. The use of exploratory factor analysis for similar researches particularly those relating to performance evaluation scale is common place and was used by authors such as Clark and Price (2002), Pinder (2003), Clark *et al.* (2003), Shaw and Haynes (2004), Hoxley (2007) and Ahmed and Shoeb (2009).

For this study, the Principal Component Analysis (PCA) factorization method was used. The overall factorability of the data was determined using, correlation matrix, multicollinearity and sufficiency of the sample size vis-à-vis the number of variables. Other tests that were used were the Keiser Meyer Olkin (KMO) test of sampling adequacy and Bartlett's test of sphericity. The PCA was done separately for each category index (i.e. comfort variables separately from the satisfaction ones etc.). The number of factors to be extracted in each case was decided using Keiser's criterion (Eigen value of 1 and above) in combination with Carttell Scree plot test. Keiser's criterion is best where the variables to be reduced are less than 30, the

average communality after extraction is more than 0.7 and the sample size is more than 250. Where most or all of these conditions are absent as in the case with the current study, Cartell's scree plot becomes the preferable method, either singly or in combination with Eigen value (Field, 2009 and DeCoster, 2004). This combination of the two criteria reduced the number of extracted factors further in some of the cases and threw up more reliable extraction values (Field, 2004). The extracted factors were thereafter rotated to obtain the correlation matrices using varimax method, a form of orthogonal rotation. Rotation also makes the components that load heavily on each factor readily discernible. Varimax rotation method is preferable to its alternative the oblique method where there is the need to avoid cross loading of variables on two or more factors as is required in this study. The extracted factors were thereafter labelled according to the theme of the components that loaded heavily on each factor. Thereafter, the factor loading were correlated (multiple correlation) with building performance value jointly and individually using Pearson's correlation coefficient a method of parametric analysis. This is in view of the fact that that the data in this research assumes an interval scale.

To test the relevant hypotheses for this objective, (Hypothesis three) i.e. there is no significant relationship between level of effectiveness facility management and office building performance, the obtained correlation values were tested for significance. This was first done for the joint correlation between all the effectiveness of FM factors and building performance and thereafter for each of the FM effectiveness factors (independent variables) and (the dependent variable) building performance individually (Newcastle University, 2007). For this second set of tests a sub-hypothesis was postulated for each factor.

Objective five develops a predictive model for evaluating building performance from the effectiveness of FM service. Therefore, two set of values were used in the analysis. These are respondents rating of performance of the office buildings and that of the effectiveness of FM services in the buildings. In line with statistical notion of not using too numerous independent variable in a regression analysis (Field, 2009) there was again a need to reduce the number of the independent variables from the 31 measures to a more manageable number by using important underlying factors instead of the individual measures . However, since the important factors have already been identified in objective four the same set of factors were merely incorporated as the independent variables in this analysis, while the building performance value from objective two was used as the outcome or dependent variable. Thereafter multiple regression analysis was used to determine the coefficient of determination and regression equation or model of the relationship between the dependent and the independent variable. Multiple regression analysis is the appropriate method of analysis where there is more than one independent variable in the analysis as is the case with this research. Regression analysis is popular amongst researchers including those in the FM subject area whenever the intention is to establish a predictive or causal relationship between variables. Example of such researches include, Nwankwo, Owusu-Frimpong and Ekwulugo (2004), Shaw and Haynes (2004), Koutouris and Alexandris (2005); Stoy and Kytzia (2006) and Ahadzie *et al.* (2008) to mention a few. The standardised beta coefficients of each of the independent variables were also obtained to indicate the individual contribution of each of them to the dependent variable. Hypothesis four was tested using ANOVA test of the F ratio, which is a measure of how much the model has improved the prediction of the independent variable (Building performance) compared to the inaccuracy in the model.

The model was cross validated using both adjusted coefficient of determination ($R^2$) and split sample validation method. Cross validating a model indicates that similar samples would produce similar model parameters. However, it does not indicate that the model can be applied beyond the sample into the population with some level of certainty. This can only be achieved by ruling out bias in the model using a number of tests of assumptions of an unbiased model. The test used in this research includes, test for absence of outliers or undue influence of cases, heteroscedasticity and linearity (using cook's distance and the scatter plots of regression standardized residual against standardized predicted value (Z resid against Z pred). Others are test for multicollinearity (using correlation matrix between the dependent variables), non-serial autocorrelation (using Durbin Watson value), normality of distributed error (using histogram of regression standardized residuals) and normality of distribution (using Normal Probability Plot of Regression Standardized residual).

## 3.14 PILOT STUDY

A pilot study was done to pre-test the two questionnaires on a similar sample comprising 50 users and 20 service providers from 10 buildings. Forty six duly filled questionnaires representing 66% were retrieved. This comprised 33 questionnaires from the users and 13 from the service providers out of which 4 belonged to the strategic FM category.

The pilot study helped to identify underlying difficulties with the questionnaire and the study in general; so that such issues can be resolved before embarking on the main study. There were a number of complaints on the length of the questionnaire during the pilot study. In view of this, all variables with a mean item score of less than two (2) i.e. unimportant and any other

less relevant variable (as deemed by the researcher and her supervisor) were eliminated from the list of important performance measures to produce a more concise lists that was used in this final study. Interview sessions with experts and observation by the way of a walk-through during the pilot stage helped to further improve the list of measures for the final study.

The data from the pilot study was analysed to establish if the variables work well and measure what they were supposed to measure. At this stage, it was found that majority of the open ended questions remained unanswered. This implied the need to limit open ended questions to the barest minimum in order to minimize missing values. Respondents indicated that they find open ended questions difficult to respond to because they were not willing to have any deep thoughts in answering questions in a survey and would rather have multiple choice questions and close ended ones with options that they can just pick from. Questions that were difficult to comprehend were identified during the pilot study and were rephrased.

The pilot study also included questions that gave the respondents opportunity to indicate how difficult or easy they found the questionnaires and the quality of the questions and if they thought there are other areas that the questionnaires could cover. Although a sizeable percentage complained about the length of the questionnaires they made many positive comments on the depth and quality of the questions as well as ease of comprehension. One of the respondents indicated that he will be grateful if the findings of the survey are made available for his personal enlightenment on completion, while another respondent recommended that the findings should be reflected in the next modification of the national building code. This is a reflection of the validity of the questionnaire from the respondents' perspective.

## 3.15 VALIDITY AND RELIABILITY TESTS

In statistical research, validity refers to the level of correctness of a measure in assessing value of what it is supposed to measure (Bell, 1999). The content validity of the research instrument used for this study was done by eight (8) experts (Four in the academia and the other four in FM practice). The researcher's supervisors also validated the content of the questionnaire. The four practitioners were FM service providers from the banking, communication, parcel service and private FM contracting sectors. The questionnaires were also presented to a focus group of Ph.D. candidates in the field of construction management. The questionnaires that were used for the pilot study reflected all the modifications suggested by these groups of people. Further validation of the questionnaire was done using a pilot study, details of which have been provided earlier.

Reliability is the extent to which a method or research is capable of producing similar results under the same situation at all times. It can be tested using test-retest, alternate or multiple forms and internal consistency. Reliability test for this study was done using internal consistency method using coefficient alpha which is said to be preferable for summated rating scales (Asika, 2004). In view of this, the coefficient alpha otherwise known as Cronbach's Alpha reliability was carried out for the data used in this study. Table 3.1 presents the values for each category of the three major constructs that are used in this study i.e. important measure of effectiveness of FM, perceived level of FM effectiveness, perceived level of building performance and the overall alpha value.

The average Cronbach's Alpha reliability value was found to be 0.930. This is significantly more than the satisfactory 0.7 and 0.6 values recommended in Robson (2000) and Asika (2004) respectively. This implies that the data used in this study are adequately reliable.

**Table 3.1: Cronbanch's Alpha Reliability of Scales Values**

| Category of measure | Related objective/Data | Cronbanch's Alpha |
|---|---|---|
| Quality of service | Objective 1- Important FM Effectiveness measures | 0.899 |
| Response to crises | Objective 1- Important FM Effectiveness measures | 0.926 |
| Satisfaction | Objective 2 - Building performance | 0.964 |
| Comfort | Objective 2- Building performance | 0.940 |
| Quality of service | Objective 3 and 4 – Perceived Quality of FM | 0.939 |
| Response to Crises | Objective 3 and 4 – Perceived Quality of FM | 0.910 |
| **Overall for the study** | **All relevant scales** | **0.930** |

# CHAPTER FOUR

# DATA ANALYSIS AND RESULTS PRESENTATION

## 4.1 INTRODUCTION

This chapter presents the data that were gathered for this study and the analysis. It also presents and interprets the results with a view to providing answers to the research questions that were postulated to achieve the objectives of the study. The chapter was divided into eight distinctive sections. The first section (4.1) introduces the chapter. The second section discusses the administration and retrieval of the questionnaires that were used in this study, while the third presents the characteristics of the building and respondents (both the office users and BSS providers) used in the study, such as user age, sex, highest academic qualification and professional affiliations. Sections four to eight present and interpret the results from this study, one section to each of the objectives of this study.

## 4.2 QUESTIONNAIRE ADMINISTRATION AND RETRIEVAL

The questionnaires used in gathering the data were administered and retrieved personally by the researcher with the aid of trained field assistants and supervisors. The responses that were obtained were coded and analysed using Statistical Package for Social Scientists (SPSS version 17). Table 4.1 provides details of the number of administered and retrieved questionnaires. Nine (9) out of the 41 purpose built office buildings that were used in this study are managed and operated by practitioners who adopt strategic FM principles. From the total of 492 questionnaires, 108 were administered on respondents in these buildings, out of which 67 valid questionnaires (62%) were retrieved.

| Description | Non-Strategic FM Buildings | | | Strategic FM Buildings | | | Total For All Buildings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Administered | Retrieved (Valid) | | Administered | Retrieved (Valid) | | Administered | Retrieved (Valid) | |
| | | No | % | | No | % | | No | % |
| Users | 288 | 137 | 47.5 | 81 | 50 | 61.7 | 369 | 187 | 50.1 |
| Service providers | 96 | 50 | 52.1 | 27 | 17 | 62.9 | 123 | 67 | 54.5 |
| **Total** | **384** | **187** | **48.7** | **108** | **67** | **62** | **492** | **254** | **51** |

**Table 4.1: Administered and Retrieved Questionnaires**

***Source: Field study, 2011***

The remaining 384 questionnaires were administered to respondents in buildings managed by the non-strategic FM practitioners (other BSS providers), out of which 187 valid questionnaires (49%) were retrieved. 369 questionnaires were administered on the building users and 123 to the building service providers. Out of this numbers, 187 representing a response rate of 50% were retrieved from the users, while 67 representing 54.5% were retrieved for the BSS providers. The overall average response rate was 51.6%. This is a good response rate and is comparable to average response rates of 48.55% in Okoroh, Jones and Ilozoh (2003) and 51% in Durodola (2008).

## 4.3 SAMPLE CHARACTERISTICS

### 4.3.1 Characteristics of the Buildings used in the study

This sub-section discusses the characteristics of the building sample such as the number of floors, gross floor area, location (local government area) and age. These results are presented in Table 4.2. At least 4 buildings were considered from each local government. The research sample is dominated by buildings located within Eti-Osa local government featuring 31.7%, followed by Ikeja local government with 29.3. Lagos Island and Kosofe have equal numbers at

14.62%, while Apapa has the least number of buildings with 9.76%. These proportions appear to be a good representation of the volume of office buildings in each of these local government areas. For instance 16 out of the 23 head or regional office of banks in Lagos state are located in Victoria Island in Eti-Osa local government, while the remaining seven (7) are located within Lagos Island. Similarly, Victoria Island houses the greatest numbers of Insurance companies, international airlines offices, Chamber of commerce offices and embassies while Ikeja, has the 2nd or 3rd highest population of offices buildings in these earlier mentioned business categories (Lagos state government, 2011).

**Table 4.2: Building Characteristics**

| **Local Govt. Areas** | **Apapa** | **Eti-Osa** | **Ikeja** | **Kosofe** | **Lagos Island** | **Total** |
|---|---|---|---|---|---|---|
| Frequencies | 4 | 13 | 12 | 6 | 6 | 41 |
| Percentage (%) | 9.76 | 31.7 | 29.3 | 14.62 | 14.62 | 100 |
| **Number of Floors in Building Sample** | **Up to 4** | **5 - 8** | **9 - 12** | **13-16** | **Above 16** | **Total** |
| Frequencies | 20 | 8 | 4 | 3 | 2 | 37 |
| Percentage (%) | 54 | 22 | 10.6 | 8 | 5.4 | 100 |
| **Age of Building Sample (Years)** | **Under 5** | **6 – 10** | **11- 15** | **16-20** | **Above 20** | **Total** |
| Frequencies | 2 | 7 | 8 | 7 | 14 | 38 |
| Percentage (%) | 5.2 | 18.4 | 21 | 18.4 | 37 | 100 |
| **Gross Floor Area buildings** | **Below 500** | **501- 2000** | **2001-4000** | **4001-8000** | **Above 8000** | **Total** |
| Values | 4 | 6 | 5 | 4 | 4 | 23 |
| Percentage (%) | 17.4 | 26 | 21.8 | 17.4 | 17.4 | 100 |

Table 4.2 indicate that the sample is made up of buildings with a wide spread of number of floors (between 2 and 22 floors). Although dominated by low rise buildings of between 2 and 4 floors featuring 54%, medium rise buildings of between 5 and 8 floors are also well represented at 22% of the sample, while high rise buildings of above 8 floors constitute 24%.

It is expected that this wide spread will make the findings of this study applicable to these three different categories (rise) of buildings.

Table 4.2 also shows that although buildings that are above 20 years are predominant in the building sample (37%), buildings in other age categories are well represented with those under 5 years representing 5.2%, those in the 11 -15 years bracket representing 21%, while those in the 6-10 years and 16-20 years categories constitute 18.4% each. This indicates that the sample again featured a wide spread in the ages of the buildings. It is possible that more of the buildings are older than 20 years because the bulk of new purpose built office constructions since 1992 when the seat of government moved to Abuja has been in the new capital city and not Lagos. According to the table, buildings with floor spaces below 500m$^2$; 4001- 8000m$^2$ and above 8000m$^2$ each represent 17.4%. Buildings with floor spaces between 2001- 4000m$^2$ represent 21.8% while those in the 501-2000m$^2$ category cover 26%. This implies that the buildings in this sample ranges from small to very large buildings, thereby providing good representation of various building sizes.

### 4.3.2 Characteristics of the respondents

It was considered necessary to examine the characteristics of the respondents in order to determine their suitability and the reliability of their responses. There were two sets of questionnaires utilized in this study (one for building users and the other for building support service providers). Invariably, the respondents were also in these two categories.

***Characteristics of Respondents in the Building User Category***

The proportion of men to women among this group of respondents is 60.9% to 39.1% (Table 4.3). These proportions are a close representative of the larger Nigerian society where 35.4% of the country's labour force is made up by women (UN statistics, 2008). Similarly, 39.2% and 60.8% of the country's female and male adult population respectively forms part of the labour force (UN statistics, 2011). This indicates that this survey achieved a proportionately even spread implying that the views of both genders are relatively well represented in the study.

Most of the respondents are middle aged between 26-45 years old (80.3%). This is the most active age bracket being just above the youthful age of 15-24 years. Specifically, persons aged between 18-25 years represent 10.9% of all user respondents, while those aged 26-35 years represent 54.1%. Those aged 36-45 years accounts for 26.2%. Those aged 46-55years is 7.7% while those aged 55 and above represent 1.1% (Table 4.3). In summary, over 89% of these respondents are adult population of 26 years and above. Table 4.3 also shows the highest academic qualification of the respondents. Although this cuts across various levels, majority of them are well educated with tertiary level education (about 95.5%). Specifically, 3.3% of them have primary/secondary school certificate, 9.9% have OND, and 18.2% have HND, while 37% of them have a B.Sc qualification. In fact 30.4% have post graduate qualifications at M.Sc, PgC or PgD levels. This high level of education among the respondents suggests that their levels of comprehension and invariably responses will be appropriate to this study.

The work designation of the respondents cuts across the various employee cadres. This implies that the views of the various office users are well represented. However, majority of them are senior officers who have greater need for a well performing office. Around 65% of the

respondents are senior staff with as many as 22.3% occupying Chairman/CEO and managerial positions.

**Table 4.3: Characteristics of Respondents-Users**

| Characteristics | STRATEGIC FM | | NON-STRATEGIC-FM | | TOTAL | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| **Sex** | | | | | | |
| Male | 21 | 61.8 | 91 | 60.7 | 112 | 60.9 |
| Female | 13 | 38.2 | 59 | 39.3 | 72 | 39.1 |
| **Total** | **34** | **100** | **150** | **100** | **184** | **100** |
| **Age** | | | | | | |
| 18-25 years | 2 | 5.9 | 18 | 12.1 | 20 | 10.9 |
| 26-35 years | 21 | 61.8 | 78 | 52.3 | 99 | 54.1 |
| 36-45 years | 9 | 26.5 | 39 | 26.2 | 48 | 26.2 |
| 46-55 years | 2 | 5.9 | 12 | 8.1 | 14 | 7.7 |
| Above 55years | - | - | 2 | 1.3 | 2 | 1.1 |
| **Total** | **34** | **100** | **149** | **100** | **183** | **100** |
| **Highest Academic Qualification** | | | | | | |
| Primary S. Cert. | - | - | 2 | 1.4 | 2 | 1.1 |
| SSCE | 1 | 2.9 | 3 | 2.0 | 4 | 2.2 |
| OND | - | - | 18 | 12.2 | 18 | 9.9 |
| HND | 7 | 20.6 | 26 | 17.7 | 33 | 18.2 |
| B.Sc | 15 | 44.1 | 52 | 35.4 | 67 | 37.0 |
| M.Sc | 7 | 20.6 | 38 | 25.9 | 45 | 24.9 |
| PGC | 1 | 2.9 | 1 | 0.7 | 2 | 1.1 |
| PGD | 3 | 8.8 | 5 | 3.4 | 8 | 4.4 |
| Others | - | - | 2 | 1.4 | 2 | 1.1 |
| **Total** | **34** | **100** | **147** | **100** | **181** | **100** |
| **Period of Residence in the Building** | | | | | | |
| 1-5 years | 28 | 82.4 | 98 | 65.1 | 127 | 68.2 |
| 6-10 years | 4 | 11.8 | 30 | 19.7 | 34 | 18.3 |
| 11-15years | - | - | 8 | 5.3 | 8 | 4.3 |
| 16-20years | 2 | 5.9 | 7 | 4.6 | 9 | 4.8 |
| Above 20 years | - | - | 8 | 5.3 | 8 | 4.3 |
| **Total** | **34** | **100** | **152** | **100** | **186** | **100** |
| **Work Designation** | | | | | | |
| Chairman/CEO | - | - | 2 | 1.4 | 2 | 1.1 |
| Manager | 3 | 9.1 | 35 | 24.0 | 38 | 21.2 |
| Senior Officer | 13 | 39.4 | 63 | 43.2 | 76 | 42.5 |
| Junior Officer | 12 | 36.4 | 24 | 16.4 | 36 | 20.1 |
| Office Assistant | 1 | 3.0 | 7 | 4.8 | 8 | 4.5 |
| Others | 4 | 12.1 | 15 | 10.3 | 19 | 10.6 |
| **Total** | **33** | **100** | **146** | **100** | **179** | **100** |

About 68% of the user respondents have been resident in the building for between 1-5 years, 18.3% have occupied the buildings for 6-10 years, 4.3% for 11-15 years and 4.8% for 16-20 years. A few of the respondents (4.3%) have occupied the buildings for quite a long time; over 20 years (Table 4.3). In view of these identified characteristics of the respondents it is reasonable to presume that they will be able to provide appropriate responses to the questions asked.

***Characteristics of Respondents in the Service Providers Category***

This are presented in Table 4.4 and figures 4.1, 4.2 and 4.3. Regarding the question on highest level of education (Figure 4.1), all of the strategic FM practitioners have tertiary level education with at least HND or BSc qualifications. Specifically, 47% of them have either HND or B.Sc., 13% have Pg.D or Pg.C qualifications, while 40% have MSc qualification. This distribution supports the view that FM practitioners are degree holders with technical or managerial background who then venture into support service provision (Pickard, 2006). The non-FM practitioners present a wider range of qualifications i.e. from secondary school leaving certificate to MSc. However the tertiary level qualification holders still constitute a majority with as much as 89% (67%-HND or B.Sc. and 22%-M.Sc.). Building support service professionals are expected to be graduates, therefore the high level of education of these respondent suggest that they will be able to provide suitable and relevant responses for this study.

As indicated in Table 4.4, only 10 of the 17 service providers who adopt strategic FM principles responded to the question on professional qualification. Expectedly, the most

popular professional qualification among these respondents is MIFMA (Members International Facilities Management Association) with 30% having this qualification.

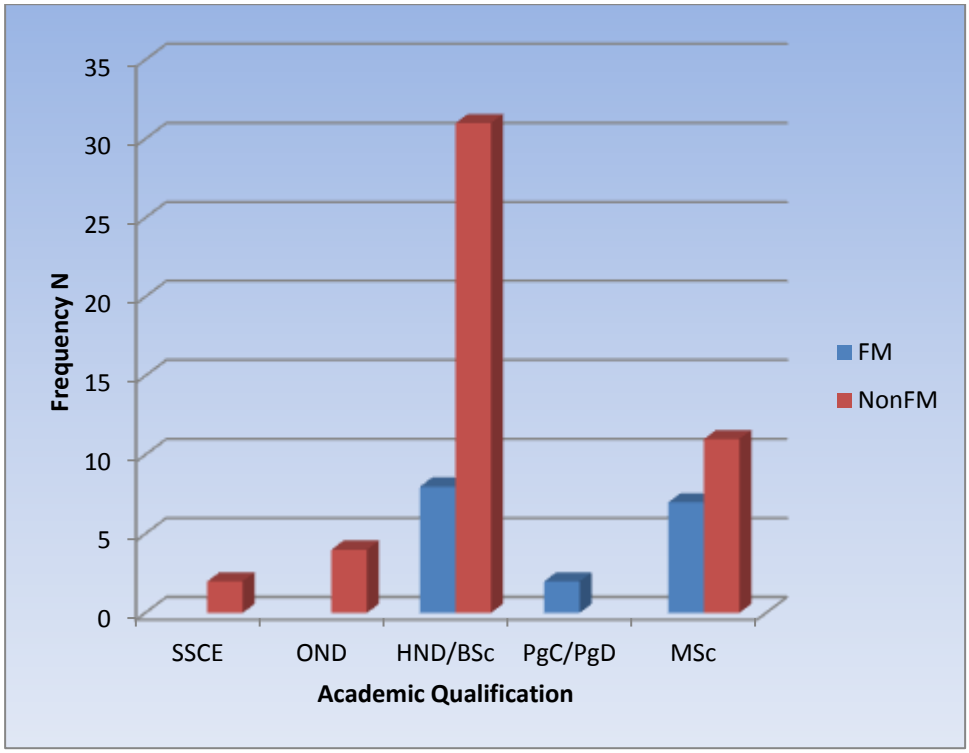



***Figure 4.1: Highest Academic Qualification of Support Service Providers***

Ten percent have MNIQS (Member Nigerian Institute of Quantity Surveyors), while the remaining 60% possess other qualification such as MNITP (Member Nigerian Institute of Town Planners), MNIOB (Member Nigerian Institute of Builders), MNIA (Member Nigerian Institute of Architects), MNSE (Member Nigerian Society of Engineers) etc. None of this category of service providers (strategic FM) has estate management qualification or affiliations; interestingly this is the most popular qualification among the service providers who adopt non-strategic FM principles with 64% of them in this profession. This implies that most practitioners of strategic FM in Nigeria do not have estate management professional background. This is probably because most estate managers provide largely property

management services and only provide facilities management services by way of maintenance of services in buildings only where this falls within their scope of work as property managers. Four percent of the non-strategic FM respondents each have MNIQS, MIFMA and MNIA, while 24% have other professional qualifications such as MNITP, MNIOB, MNIA, MNSE etc.

**Table 4.4: Characteristics of Respondents-Service Providers**

| Characteristics | STRATEGIC FM | | NON-STRATEGIC FM | | TOTAL | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| **Professional Qualification** | | | | | | |
| ANIVS | - | - | 16 | 64.0 | 16 | 45.7 |
| MNIQS | 1 | 10.0 | 1 | 4.0 | 2 | 5.7 |
| MIFMA | 3 | 30.0 | 1 | 4.0 | 4 | 11.4 |
| MNIA | - | - | 1 | 4.0 | 1 | 2.9 |
| Others | 6 | 60.0 | 6 | 24.0 | 12 | 34.3 |
| **Total** | **10** | **100** | **25** | **100** | **35** | **100** |
| **Professional Association** | | | | | | |
| NIESV | 2 | 20.0 | 15 | 45.5 | 17 | 39.5 |
| NIA | 1 | 10.0 | - | - | 1 | 2.3 |
| NITP | - | - | 2 | 6.1 | 2 | 4.7 |
| NIB | 1 | 10.0 | 2 | 6.1 | 3 | 7.0 |
| NIQS | 1 | 10.0 | - | - | 3 | 7.0 |
| NIE | - | - | 3 | 9.1 | 1 | 2.3 |
| IFMA | 4 | 40.0 | 4 | 12.1 | 8 | 18.6 |
| NIESV & NITP | - | - | 1 | 3.0 | 3 | 7.0 |
| NIESV & RICS | - | - | 1 | 3.0 | 1 | 2.3 |
| NIESV& OTHERS | - | - | 1 | 3.0 | 1 | 2.3 |
| NIB, NIQS & RICS | - | - | 1 | 3.0 | 1 | 2.3 |
| IFMA & Others | - | - | 1 | 3.0 | 1 | 2.3 |
| NIM | 1 | 10 | 2 | 6.1 | 1 | 2.3 |
| **Total** | **10** | **100** | **33** | **100** | **43** | **100** |
| **No of yrs of involvement i Mgt of Bldg** | | | | | | |
| Less than 1 yr | 1 | 6.3 | 9 | 18.4 | 10 | 15.4 |
| 1-5 years | 9 | 56.3 | 27 | 55.1 | 36 | 55.4 |
| 6-10 years | 5 | 31.3 | 8 | 16.3 | 13 | 20.0 |
| 11-15 years | - | - | 2 | 4.1 | 2 | 3.1 |
| 16-20 years | - | - | 2 | 4.1 | 2 | 3.1 |
| Above 20 years | 1 | 6.3 | 1 | 2.0 | 2 | 3.1 |
| **Total** | **16** | **100** | **49** | **100** | **65** | **100** |

The support service providers were also required to indicate their professional affiliations (association). Majority of the strategic FM practitioners (40%) are members of IFMA, 20% are members of NIESV, while 10% each are members of NIA, NITP and NIOB. This is a good spread for this study as IFMA is the most recognized professional body for facilities managers in Nigeria, and a large number of NIESV members end up in FM because the scope of their primary profession is entailed within FM. As indicated earlier, majority of the Non-strategic FM service providers are members of NIESV (45.5%), 15% are jointly members of NIESV and some other associations including IFMA and RICS (the UK equivalent of NIESV). Twelve percent of the respondents are members of IFMA indicating that at least 72% are either members of NIESV or IFMA, while only the remaining 28% belong to the numerous other professions. This is a good indication because these are the two most recognized professional bodies for building and facilities operations and management in Nigeria.

Most strategic FM practitioners among the respondents (87%) have worked with their buildings for between 1 and 10 years. Out of this, respondents who have worked with the building for 1-5 years constitute 56.3% while those who have worked for 6-10 years constitute 31.3%. None of the practitioners have worked with their buildings for between 11-20 years, while only 1 respondent representing 6.3% has worked beyond 20 years on his building. This is not unexpected because of the relative newness of the FM practice. Another possible reason for this is that most practitioners of FM today started off in other professions such as engineering, town planning and architecture and only moved into FM with the relative growth of the practice in Nigeria. The respondents among the Non-FM service support providers category is equally dominated by practitioners who have worked on the building sample for between 1-5 years (55.1%), although there is a better spread within the categories as 16.3%

have had 6-10 years' experience in the building sample and 10.2% have had 11 years' experience and above in their buildings. In total, 55.4% of all support service providers have worked for 1-5years on the building sample, 20% have worked for 6-10 years and 9.3% have worked above 10 years.

The respondents (Service providers) were required to indicate their gender. Their responses are displayed in Figure 4.2. In total, about 88% are male while 12% are females. These ratios are similar to those of the Nigerian construction industry workforce at 16.3% to 83.7% for female and male respectively (Adeyemi, 2006). This implies that the gender distribution in this study is representative of that of the larger society.

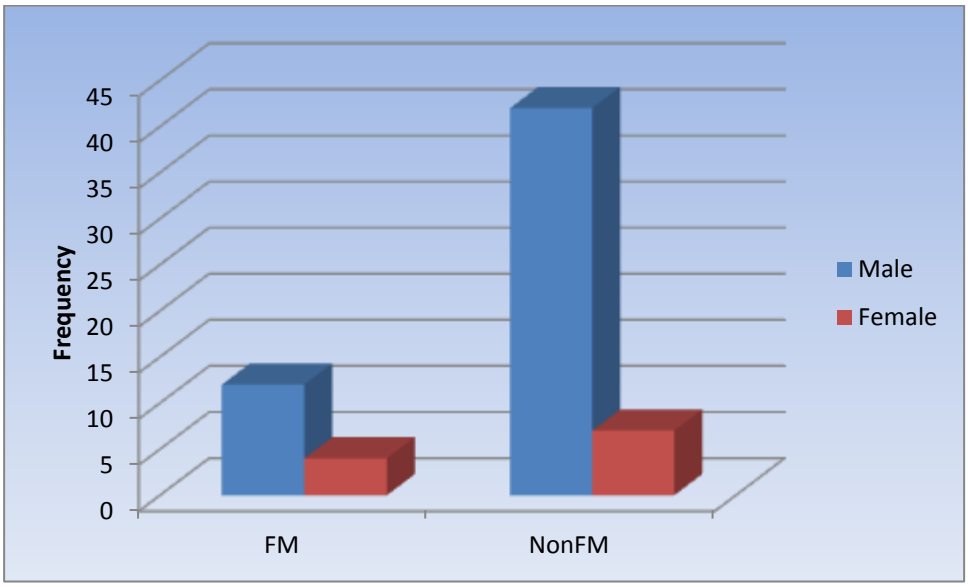



***Figure 4.2: Gender distribution of the support service providers***

The support service providers were also required to indicate their employment status to make it possible to determine the proportion that are employees' of the client company and those

who provide support service as external contractors. It was found that majority of the service providers are employed by the company they provide support service for. Specifically, about 82% of the respondents are employees and 18% are non-employees. Among the strategic FM practitioners only a minority (about 7%) are non-employees, the remaining 93% are employees, while among the non-strategic FM practitioners 22% are non-employees and 78% are employees (Table 4.4). This is good for the survey as service providers that are employees are likely to be more familiar with company objectives such that they can implement this on facility provisions and enhance performance (Williams, 2003). This suggests that the responses of the service providers in this study are likely to the more relevant and appropriate.

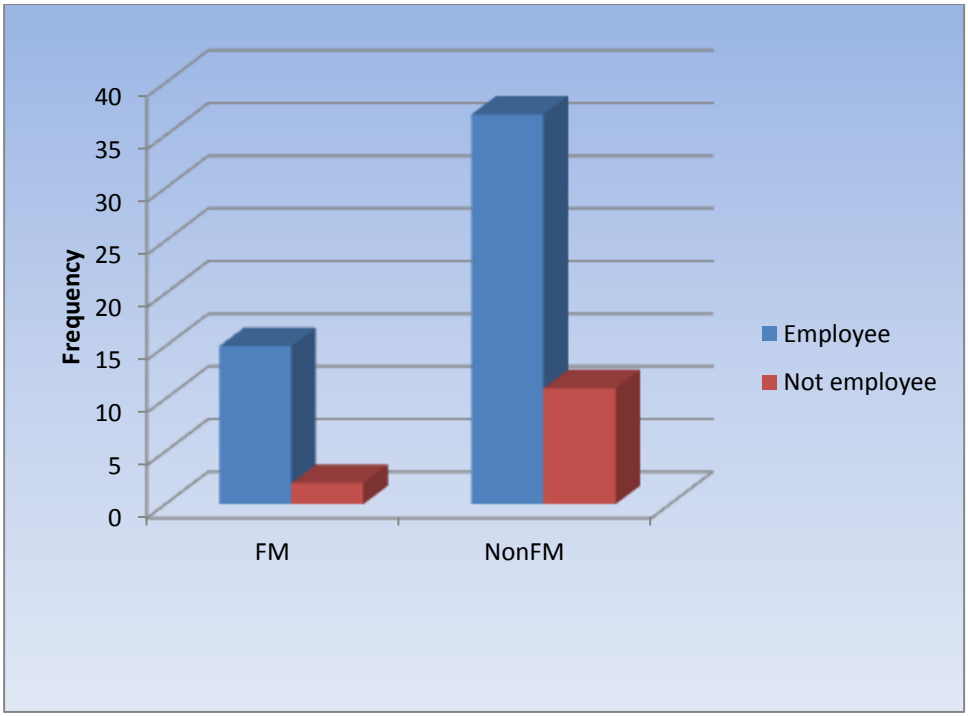



***Figure 4.3: Support service providers' employment status within their organizations***

## 4.4 KEY MEASURES OF EFFECTIVENESS OF FM SERVICES IN OFFICE BUILDINGS

This section presents the result of the analysis of data pertaining to the first objective which is "To identify key measures of the effectiveness of facilities management service that are relevant to the study area"

As indicated in the conceptual framework, three major categories of variables were used in the study i.e. the Financial, quality of service and crises response and management categories. The research featured 42 measures of effectiveness of FM service under these three categories. Out of this, 8 (eight) are in the financial category, 22 in the quality of service category and 12 in the crises response and management category (Table 4.5). For easy identification of the categories to which the variables belong, an abbreviation of the name of the applicable category is placed in bracket with each variable. Hence, F was used to identify measures in the financial category, QS was used for those in the quality of service category, while RC was used for the crises response and management category.

In the first place, the mean values were obtained from the analysis of the respondents' ratings of how important these variables are as measures of the level of effectiveness of FM. The rating was done on a scale of 1-5 interpreted as follows: not important (1), hardly important (2), somewhat important (3), important (4) and very important (5). Thereafter, the variables were ranked on the basis of the obtained mean values (in a descending order). Wherever there is a tie in the ranking the same position is used for all variables in the tie but the position of the next variable is adjusted accordingly.

**Table 4.5: Importance of Key Measures of Effectiveness of FM Service**

| Measures | Df | Mean | Rank | Chi-square | Significance Level |
|---|---|---|---|---|---|
| Prevention of fire, accidents and health emergencies (RC) | 180 | 4.69 | 1 | 370.611 | 0.001 |
| Plan of action in case there is fire accidents or other health emergencies within the building (RC) | 177 | 4.60 | 2 | 201.418 | 0.001 |
| Occupancy cost per annum per square metre/foot (F) | 48 | 4.54 | 3 | 48.833 | 0.001 |
| Use of quality materials in providing service (QS) | 178 | 4.52 | 4 | 162.180 | 0.001 |
| Response plan to main electric power outage and other sources of power (RC) | 182 | 4.49 | 5 | 168.637 | 0.001 |
| Provision of safe environment (QS) | 175 | 4.47 | 6 | 140.634 | 0.001 |
| Effective and timely correction of faults (QS) | 175 | 4.46 | 7 | 139.766 | 0.001 |
| Customer satisfaction with facilities (QS) | 178 | 4.44 | 8 | 138.000 | 0.001 |
| Total operating cost per annum per square metre (F) | 46 | 4.44 | 8 | 33.826 | 0.001 |
| Response plan to failure in public mains water and other water supply sources (RC) | 178 | 4.43 | 10 | 220.596 | 0.001 |
| Rent earned by building per square metre (F) | 48 | 4.40 | 11 | 31.833 | 0.001 |
| Maintenance cost per square metre or foot (F) | 48 | 4.40 | 11 | 31.833 | 0.001 |
| Completion of works to customer requirement and time deadline (QS) | 180 | 4.39 | 13 | 136.311 | 0.001 |
| Satisfactory standard of cleaning (QS) | 179 | 4.39 | 14 | 66.179 | 0.001 |
| Total operating cost per square metre for individual major item of overhead (F) | 49 | 4.37 | 15 | 10.082 | 0.006 |
| Total asset value (F) | 47 | 4.36 | 16 | 53.319 | 0.001 |
| Effective management of maintenance functions (QS) | 178 | 4.34 | 17 | 196.382 | 0.001 |
| Provision for response to leakages (RC) | 181 | 4.34 | 17 | 189.414 | 0.001 |
| Suitability of building fittings and environment to work (QS) | 177 | 4.32 | 19 | 112.831 | 0.001 |
| Satisfaction with facilities and physical working condition (QS) | 181 | 4.30 | 20 | 112.282 | 0.001 |
| High level of energy performance (QS) | 179 | 4.30 | 20 | 97.804 | 0.001 |
| Effectiveness of communication provisions and management of information (QS) | 180 | 4.28 | 22 | 32.700 | 0.001 |
| Responsiveness of FM department (QS) | 171 | 4.27 | 23 | 94.053 | 0.001 |
| Managing unexpected breakdown of fixtures and fittings (RC) | 180 | 4.27 | 23 | 208.611 | 0.001 |
| Avoidance of loss of business due to failure in premises services (QS) | 176 | 4.26 | 25 | 152.125 | 0.001 |
| Provision to ensure that only qualified and efficient artisans are engaged (RC) | 180 | 4.26 | 25 | 172.944 | 0.001 |
| Ability to meet legislative requirement in building (QS) | 177 | 4.25 | 27 | 104.831 | 0.001 |
| Reliability of building support service (QS) | 178 | 4.25 | 28 | 97.865 | 0.001 |
| Provision of serene and attractive environment (QS) | 179 | 4.25 | 28 | 167.788 | 0.001 |
| Provision of relevant and high quality equipment (QS) | 180 | 4.23 | 30 | 100.000 | 0.001 |
| Friendly and courteous premises staff (QS) | 178 | 4.23 | 31 | 106.090 | 0.001 |
| Good quality end product and ensuring value for work done by suppliers (QS) | 178 | 4.22 | 32 | 97.685 | 0.001 |

| Measures | Df | Mean | Rank | Chi-square | Significan-ce level |
|---|---|---|---|---|---|
| Response to plan to breakdown of equipment (RC) | 182 | 4.19 | 33 | 141.736 | 0.001 |
| High level competence and professional approach of premises staff (QS) | 176 | 4.18 | 34 | 114.864 | 0.001 |
| Response plan to scarcity of required materials (RC) | 182 | 4.18 | 34 | 155.747 | 0.001 |
| Effective and proactive complaint/help desk service (QS) | 178 | 4.08 | 36 | 123.629 | 0.001 |
| Managing effect of corruption and lack of transparency of service officials and artisans (RC) | 181 | 4.08 | 36 | 109.525 | 0.001 |
| Managing instances of adulteration and fake equipment and spare parts (RC) | 176 | 4.05 | 36 | 111.216 | 0.001 |
| Managing effect of hectic and unpredictable traffic situation on quality of service (RC) | 179 | 4.00 | 39 | 123.430 | 0.001 |
| Average annual percentage of vacancy in property (F) | 46 | 3.85 | 40 | 22.478 | 0.001 |
| Level of absenteeism of FM/premises staff (QS) | 177 | 3.82 | 41 | 98.734 | 0.001 |
| Number of prospective tenants who show interests in renting space per month (F) | 46 | 1.27 | 42 | 10.739 | 0.001 |

**$P \leq 0.01$**

The mean values were individually subjected to chi square test for significance at 99% and at the degree of freedom indicated for each of them. The purpose of this is to determine if the variations in the scoring by the respondents within the five point scale used is statistically significant for each variable, thereby establishing the position of each variable in the ranking. The results are depicted for all variables together in Table 4.5. The chi-square values for each variable is found to be significant at 99% thus establishing that the variations in the mean values of the variables are real and hence the variations in the position of their importance is also real and not just a result of random variation.

The mean values were used to determine the applicable measures from the list. A criterion of an average score of 3.5 and above was used. This is midway between the ratings for “somewhat important” (3) and “important” (4). The results as indicated in Table 4.6 are that, users rated 39 out of the 42 measures as important and above (> 4). This indicates that all first 39 measures are considered quite important measures of FM effectiveness by the users

and could be used in empirical studies. The three measures rated lower than 4 are; Average annual percentage of vacancy in property (3.84), Level of absenteeism of FM/premises staff (3.82) and Number of prospective tenants who show interests in renting space per month (1.27 - important). This implies that although the first two of these last three variables are rated in the "somewhat important" scale (between 3 and 4) they are still quite important as both scores are greater than the 3.5 cut off criterion.

The least rated variable "number of prospective tenants who show interests in renting space per month" is a financial measure that indicates how desirable a building is to prospective tenants. This variable was rated 1.27, implying that it is considered unimportant by the respondents. Therefore, it was not included in the list of measures that was used in the evaluation of effectiveness of FM, later in the study, while the remaining 41 were retained.

The ranks of the measures (Table 4.5) indicate that the variables "prevention of fire accidents and other health emergencies (RC)", "plan of action in case of fire, accidents and other health emergencies (RC)" and "occupancy costs per annum per square metre (F)" were rated 1$^{st}$, 2$^{nd}$ and 3$^{rd}$ most important measures of effectiveness of FM respectively. This emphasizes the importance of health emergencies, accidents and fire prevention and management ability of the facilities manager to the building users. Other top ranking variables ranked 4$^{th}$ to 10$^{th}$ respectively are "Use of quality materials in providing service (QS) "Response plan to mains electric power outage and other sources of power (RC)" "Provision of safe environment (QS)" "Effective and timely correction of faults (QS)" "Customer satisfaction with facilities (QS)" Total operating cost per annum per square metre

(F) and “Response plan to failure in public mains water and other water supply sources (RC)”.

It seems that measures in the financial category are relatively less important to the respondents as just five (5) out of the eight (8) financial variables that were included in this study were considered “important”. Two other (2) variables were rated “somewhat important” while the last one (1) i.e. “Number of prospective tenants who show interests in renting space per month” was rated “not important”. These last three (3) variables were also the least rated variables overall.

It is important to mention that in contrast to the financial variables, respondents rated measures in the crisis response and management category quite importantly. The top two (2) measures and four (4) out of the first ten most important measures are in this category (Table 4.5). Also, all measures in this category have an average score of at least 4 (important). This justifies the inclusion of this category of measures in this study, as an innovation for the Nigerian context and supports the notion that Nigerian facility managers must be up to task with these aspects of their responsibilities to be able to make a difference to the clients’ business

## 4.5 LEVEL OF PERFORMANCE OF OFFICE BUILDINGS IN LAGOS METROPOLIS

This section presents the analysis and findings in objective two which is “To evaluate the level of performance of office buildings in Lagos metropolis” As can be found in the conceptual framework, building performance was measured from three major categories of

variables i.e. the “financial”, “satisfaction with the work environment” and “comfort” categories. The research used 55 measures of building performance under these three categories. Out of this 10 (ten) are in the “financial” category”, 18 in the “comfort” category and 27 in the “satisfaction with work environment” category.

The overall performance value was supposed to be based on data from these three categories of data. However it was found that only limited financial performance data was provided by the respondents. Hence this section presents the financial performance of the buildings separately as financial benchmarks. For the non-financial soft measures, the two categories of measures are presented at first, separately (Tables 4.6 and 4.7) and thereafter together (Table 4.8). This joint presentation is to enable a comparison of the relative ranking of the measures in the two categories and to facilitate the calculation of the overall mean rating of performance of the sample which is needed in the test of the hypothesis that is postulated for these data. For easy identification of the categories of the variables in the combined table an abbreviation of the names of the category is placed in bracket with each variable. Hence, SF was used for the satisfaction with work environment measures, while CF was used to identify those in the comfort category.

### 4.5.1 Financial Performance of Office buildings

For the financial data, the building support service providers were required to provide the appropriate sum (unit cost) in the form of a ratio scale. Although 8 (eight) financial measures were presented to the respondents, they only provided responses on three (3) of the measures as follows: total operating cost, total occupancy cost and total maintenance cost. In addition, out of the 41 buildings, respondents provided total operating cost data for only 10 buildings,

total occupancy cost for five (5) and total maintenance cost for only seven (7) buildings. This data though limited, were sufficient to establish average costs per $m^2$ values based on the three cost units. In other words, this research produced from these data a first strike cost benchmark that can serve as some form of external benchmark for office buildings in Lagos metropolis.

**Table 4.6: Financial performance of Lagos-Nigerian Office Buildings**

| Unit of Measurement | Gross area in $m^2$ | Total Annual costs in N | Annual costs per $m^2$ in N | Average Unit costs per annum per $m^2$ in N |
|---|---|---|---|---|
| OPERATING COSTS | 5000 | 40,000,000 | 8,000 | |
| | 3225 | 32,000,000 | 9,922.48 | |
| | 5869 | 35,242,350 | 6,004.83 | |
| | 250 | 650,000 | 2,600 | |
| | 400 | 2,500,000 | 6,250 | |
| | 4205 | 25,000,000 | 5,945.30 | |
| | 3200 | 10,000,000 | 3,125 | |
| | 1863 | 8,000,000 | 4,294.15 | |
| | 9936 | 100,000,000 | 10, 064.41 | |
| | 8600 | 70,000,0000 | 8,139.54 | **6,024.41** |
| OCCUPANCY COSTS | 5869 | 88,035,000 | 15,000 | |
| | 3200 | 80,000,000 | 25,000 | |
| | 9936 | 300,000,000 | 30,192.29 | |
| | 250 | 2,800,000 | 11,200 | |
| | 8600 | 500,000,000 | 58,139.53 | **27,906.36** |
| MAINTENANCE COSTS | 5869 | 32,038,500 | 5458.94 | |
| | 400 | 1,000,000 | 2500 | |
| | 200 | 200,000 | 1000 | |
| | 3200 | 10,000,000 | 3125 | |
| | 1863 | 7,000,000 | 3757.38 | |
| | 9936 | 50,000,000 | 5032.05 | |
| | 250 | 1,000,000 | 4000 | **3,553.34** |

Table 4.6 presents all the financial data that were provided and the average performance values that were derived from them. Results indicate that the average operating costs of office buildings in Lagos is approximately N6,024/$m^2$ per annum (six thousand and twenty four Naira). Table 4.6 also indicate that although most of the operating costs are within the range of N5000-N10,000/$m^2$ per annum, there are a few outliers with relatively lower unit costs of about N2,600. Investigation through observation and interview indicate that these lower costs are likely to have resulted from the lower level of sophistication of the provisions in these building in comparison to the others. Also indicated in Table 4.6 is that the average occupancy cost of office buildings in Lagos is approximately N27,906/$m^2$ per annum (twenty seven thousand nine hundred and six Naira). This implies that the financial performance of an office building in Lagos metropolis in terms of its occupancy cost can be determined in comparison with this per unit cost. The maintenance cost analysis indicates that the average maintenance cost of office buildings in this study is approximately N3,553/$m^2$ per annum (three thousand five hundred and fifty three Naira). The maintenance cost of average buildings can be compared with this sum to determine the performance of its cost control mechanisms.

### 4.5.2 Non-financial Performance of Office buildings in Lagos Metropolis

The mean values of the respondents' ratings for the variables were obtained along with the standard deviation. The interpretation of the ratings is as follows: (1) not satisfactory, (2) is less satisfactory, (3) somewhat satisfactory, (4) satisfactory and (5) very satisfactory. The variables were thereafter ranked on the basis of the calculated mean values (in a descending order).

**Table 4.7: Level of Performance of office Buildings (Satisfaction variables)**

| Measures of satisfaction with work environment | N | Std. Deviation | Mean | Rank | Chi-square | Significance level |
|---|---|---|---|---|---|---|
| Safety of placement of electric socket and switches | 181 | 0.871 | 4.282 | 1 | 268.204 | 0.001 |
| Overall suitability of building to organizational need | 178 | 0.959 | 4.079 | 2 | 125.989 | 0.001 |
| Level of office hygiene | 178 | 0.922 | 4.062 | 3 | 214.831 | 0.001 |
| Efficiency and comfort of office circulation space/layout | 180 | 0.953 | 3.961 | 4 | 186.667 | 0.001 |
| Safety and security of doors and gates | 180 | 1.053 | 3.950 | 5 | 180.667 | 0.001 |
| Efficiency of mains electric/emergency power provisions | 184 | 1.085 | 3.946 | 6 | 189.370 | 0.001 |
| Adequacy of the size of each office space for work going on within it | 179 | 1.038 | 3.888 | 7 | 162.196 | 0.001 |
| Level of privacy of office and protection from external distractions | 179 | 1.107 | 3.872 | 8 | 149.123 | 0.001 |
| Efficiency of waste management facilities | 184 | 1.153 | 3.837 | 9 | 145.609 | 0.001 |
| Adequacy of anti-theft and burglary provisions | 180 | 1.214 | 3.828 | 10 | 134.067 | 0.001 |
| Adequacy and convenience of water supply sources including portable water | 183 | 1.187 | 3.809 | 11 | 151.262 | 0.001 |
| Quality of office equipment | 172 | 1.126 | 3.808 | 12 | 150.256 | 0.001 |
| Efficiency of the location of private offices in relation to other offices in the department | 177 | 1.054 | 3.808 | 12 | 165.814 | 0.001 |
| Adequacy of overall building security provision | 178 | 1.077 | 3.753 | 14 | 121.865 | 0.001 |
| Adequacy and convenience of location of office equipment | 176 | 1.288 | 3.733 | 15 | 172.273 | 0.001 |
| Adequacy and efficiency of car parking provision | 180 | 1.094 | 3.722 | 16 | 142.733 | 0.001 |
| Adequacy of fire prevention provisions | 179 | 1.459 | 3.710 | 17 | 116.207 | 0.001 |
| Quality of the furniture and fittings | 177 | 1.236 | 3.706 | 18 | 115.983 | 0.001 |
| Adequacy of staff personal storage space, drawers, cabinets etc. | 183 | 1.355 | 3.705 | 19 | 156.246 | 0.001 |
| Adequacy of location and placement of fire prevention provisions, alarms, extinguisher etc | 181 | 1.607 | 3.658 | 20 | 123.011 | 0.001 |
| Convenience and privacy of location of telephone points | 178 | 1.461 | 3.562 | 21 | 161.236 | 0.001 |
| Adequacy of overall accident prevention provision | 179 | 1.354 | 3.536 | 22 | 116.341 | 0.001 |
| Adequacy of signage and direction displays | 180 | 1.275 | 3.489 | 23 | 108.267 | 0.001 |
| Efficiency of workroom | 173 | 1.427 | 3.364 | 24 | 122.595 | 0.001 |
| Efficiency and adequacy of first aid provisions | 166 | 1.763 | 3.181 | 25 | 57.663 | 0.001 |
| Adequacy of building safety, fire protection and other emergency provisions | 181 | 1.573 | 3.138 | 26 | 48.227 | 0.001 |
| Quality of escalators and adequacy of its safety provisions | 176 | 1.852 | 2.977 | 27 | 48.318 | 0.001 |

**$P \leq 0.01$**

Chi-square test for significance of the mean value for each of these variables reveals a value significant at 99% level. This again means that the differences in the mean values are real differences and not just due to random variation. The position of each of the variable is

therefore established. The standard deviation was to indicate the level of agreement of the respondents on the average rating of each variable.

***Satisfaction with Work Environment Variables***

According to the results (Table 4.7), among the satisfaction with work environment category of variables "Safety of placement of electric socket and switches", was rated as the best performing building attribute followed by "Overall suitability of building to organizational need." Level of office hygiene was rated 3$^{rd}$, Efficiency and comfort of office circulation space/layout came 4$^{th}$ while "Safety and security of doors and gates" came 5$^{th}$. Only the first three rated variables were rated at least 4 (X > 4 = satisfactory). This implies that these office buildings are performing satisfactorily only with respect to 3 of the 27 attributes of buildings that were featured in the performance analysis. In terms of the remaining 24 attributes, the buildings are performing only "somewhat satisfactorily". This indicates a strong need for improvement in most of the areas of performance of Nigerian offices.

Table 4.7 further indicates that variables such as "Efficiency of the location of private offices in relation to other offices within the department" "Adequacy of overall building security provision" and "Adequacy and convenience of location of office equipment" indicated comparatively middle level performance at the 13$^{th}$, 14$^{th}$ and 15$^{th}$ positions respectively. According to the respondents, the least three performing aspects of office buildings in the satisfaction category are, health and safety issues with "Quality of escalators and adequacy of its safety provisions" coming last at 27$^{th}$ position, followed by "Adequacy of building safety, fire protection and other emergency provisions" coming 26$^{th}$ and "Efficiency and adequacy of health and first aid provisions" ranked 25$^{th}$. It was also found that workrooms in

the study are relatively inefficient with "Efficiency of workroom" coming 24th out of 27 while, "Adequacy of signage and direction displays came 23rd.

The standard deviation values are quite acceptable being a range of between 0.872 and 1.852 for a scale with a maximum score of 5. Using the laws of standard deviation (Rowntree, 2000), it can be interpreted to mean that about 70% of the respondents scored the attributes values between 2.30 and 5, which implies that there is a reasonable consensus in the respondents' ratings.

***Comfort Variables***

Among the comfort measures "Convenience of placement of electric socket and switches", is again rated as the best performing building attribute under the comfort category (Table 4.8). The position of this first variable is consistent with the satisfaction rating where adequacy of electric sockets was rated best in terms of performance. "Adequacy and freshness of natural ventilation" was rated 2nd, while Quality of natural lighting was rated 3rd. Flexibility of position of furniture, fittings and equipment was rated as the 4th most performing comfort attribute of Lagos office buildings. This implies that issues of internal comfort are best performing comfort attributes of buildings within the study area.

According to the respondents the five least performing aspects of office building comfort in Lagos are "Comfort of lifts, elevators and escalators (18th)" followed by "Quality of humidity control provision (17th)" and "Comfort and efficiency of sun glare prevention mechanism (16th)". The analysis shows that eating facilities in Lagos offices are not performing well relatively to most other variables at 15th position. The standard deviation

values are acceptable being a range of between 0.886 and 1.730 for a scale with a maximum score of 5. Using the laws of standard deviation (Rowntree, 2000), it can be interpreted to mean that about 70% of the respondents scored the attributes values between 2.5 and 5, which implies that there is a reasonable consensus in the respondents' ratings.

**Table 4.8: Level of Performance of Office Buildings (Comfort variables)**

| | N | Std. Deviation | Mean | Rank | Chi-square | Significance level |
|---|---|---|---|---|---|---|
| Convenience of placement of electric sockets and switches | 182 | 0.886 | 4.071 | 1 | 125.857 | 0.001 |
| Adequacy and freshness of natural ventilation | 183 | 1.051 | 3.934 | 2 | 174.475 | 0.001 |
| Quality of natural lighting | 182 | 1.003 | 3.901 | 3 | 161.780 | 0.001 |
| Flexibility of position of furniture, fittings and equipment | 182 | 1.139 | 3.852 | 4 | 163.758 | 0.001 |
| Overall level of building comfort | 167 | 0.961 | 3.832 | 5 | 98.240 | 0.001 |
| Comfort of the furniture | 182 | 1.191 | 3.802 | 6 | 157.429 | 0.001 |
| Flexibility of electric lighting to suit ambient conditions | 180 | 1.099 | 3.767 | 7 | 147.200 | 0.001 |
| Comfort and cleanliness of sanitary facilities such as toilet | 182 | 1.108 | 3.747 | 8 | 134.747 | 0.001 |
| Flexibility of automated equipment control to suit needs | 178 | 1.239 | 3.629 | 9 | 151.191 | 0.001 |
| Comfort and efficiency of air-conditioning systems | 180 | 1.251 | 3.628 | 10 | 131.867 | 0.001 |
| Efficiency of external noise prevention facilities | 181 | 1.306 | 3.541 | 11 | 114.856 | 0.001 |
| Ease of retrieving stored work material and records | 177 | 1.257 | 3.520 | 12 | 106.627 | 0.001 |
| Efficiency of internal noise prevention mechanism | 181 | 1.436 | 3.470 | 13 | 103.586 | 0.001 |
| Natural temperature comfort within the building | 177 | 1.243 | 3.458 | 14 | 107.373 | 0.001 |
| Comfort and cleanliness of canteen and eating facilities | 179 | 1.641 | 3.274 | 15 | 76.721 | 0.001 |
| Comfort and efficiency of sun glare prevention mechanism | 172 | 1.437 | 3.262 | 16 | 81.605 | 0.001 |
| Quality of humidity control provision | 178 | 1.515 | 3.163 | 17 | 87.888 | 0.001 |
| Comfort of lifts, elevtors and escalators | 181 | 1.730 | 2.983 | 18 | 37.619 | 0.001 |

**$P \leq 0.01$**

***Combination of all soft measures (satisfaction and comfort variables)***

This section presents the combined results of all the soft measures which were used in this study. Results (Table 4.9) indicate that only 3 of the 45 building performance variables are rated above 4 ($X > 4$) which represent the score for satisfactory performance. These are

“adequacy of electric sockets”, “convenience of placements of electric sockets and switches” and “general office hygiene”. All other variables are in the somewhat satisfactory category. This leaves a lot to be desired.

As presented in table 4.9, four out of the first five top performing attributes of buildings are in the satisfaction category. The only comfort attribute in this group is “convenience of placement of electric socket and switches”. It is also observed that the other two comfort measures that fall within the top ten performing attributes are naturally occurring design attributes of building i.e. “adequacy of natural ventilation” and “adequacy of natural lighting”. This is probably because a number of office buildings use glazed walls and are on several floors which improve natural aeration and lighting. It is also observed that seven out of the ten least performing building attributes are in the comfort categories. This indicate that building in the study are performing better in terms of satisfactory work environment which boarders on functionality issues and that the comfort of the users is in most cases, given little attention.

The overall mean score of the satisfaction performance of the buildings at 3.74 and that of comfort performance at 3.60 are both within the “somewhat satisfactory” scale. The average performance for the two categories of measure is 3.67 out of a 5 point scale. This falls short of “satisfactory” performance but falls into the “somewhat satisfactory” performance category - an indication that conditions in office buildings needs to be improved upon. It also implies that average office buildings in Lagos metropolis are only performing somewhat satisfactorily.

**Table 4.9: Overall Performance Level of office Buildings**

| Building Performance Measurement Variables | N | Std. Deviation | Mean | Rank | Chi-square | Significance level |
|---|---|---|---|---|---|---|
| Safety of placement of electric socket and switches (SF) | 181 | 0.871 | 4.282 | 1 | 268.204 | 0.001 |
| Overall suitability of building to organizational need (SF) | 178 | 0.959 | 4.079 | 2 | 125.989 | 0.001 |
| Convenience of placement of electric sockets and switches (CF) | 182 | 0.886 | 4.071 | 3 | 125.857 | 0.001 |
| Level of office hygiene (SF) | 178 | 0.922 | 4.062 | 4 | 214.831 | 0.001 |
| Efficiency and comfort of office circulation space/layout (SF) | 180 | 0.953 | 3.961 | 5 | 186.667 | 0.001 |
| Safety and security of doors and gates ( SF) | 180 | 1.053 | 3.950 | 6 | 180.667 | 0.001 |
| Efficiency of mains electric/emergency power provisions (SF) | 184 | 1.085 | 3.946 | 7 | 189.370 | 0.001 |
| Adequacy and freshness of natural ventilation (CF) | 183 | 1.051 | 3.934 | 8 | 174.475 | 0.001 |
| Quality of natural lighting (CF) | 182 | 1.003 | 3.901 | 9 | 161.780 | 0.001 |
| Adequacy of the size of each office space to work going on within it (SF) | 179 | 1.038 | 3.888 | 10 | 162.196 | 0.001 |
| Level of privacy of office and protection from external distractions (SF) | 179 | 1.107 | 3.872 | 11 | 149.123 | 0.001 |
| Flexibility of position of furniture, fittings and equipment (CF) | 182 | 1.139 | 3.852 | 12 | 163.758 | 0.001 |
| Efficiency of waste management facilities (SF) | 184 | 1.153 | 3.837 | 13 | 145.609 | 0.001 |
| Overall level of building comfort (CF) | 167 | 0.961 | 3.832 | 14 | 98.240 | 0.001 |
| Adequacy of anti-theft and burglary provisions (SF) | 180 | 1.214 | 3.828 | 15 | 134.067 | 0.001 |
| Adequacy and convenience of water supply sources including portable water (SF) | 183 | 1.187 | 3.809 | 16 | 151.262 | 0.001 |
| Quality of office equipment (SF) | 172 | 1.126 | 3.808 | 17 | 150.256 | 0.001 |
| Efficiency of the location of private offices in relation to other offices within other offices in the department (SF) | 177 | 1.054 | 3.808 | 17 | 165.814 | 0.001 |
| Comfort of the furniture (CF) | 182 | 1.191 | 3.802 | 19 | 157.429 | 0.001 |
| Flexibility of electric lighting to suit ambient conditions (CF) | 180 | 1.099 | 3.767 | 20 | 147.200 | 0.001 |
| Adequacy of overall building security provision (SF) | 178 | 1.077 | 3.753 | 21 | 121.865 | 0.001 |
| Comfort and cleanliness of sanitary facilities such as toilet (CF) | 182 | 1.108 | 3.747 | 22 | 134.747 | 0.001 |
| Adequacy and convenience of location of office equipment (SF) | 176 | 1.288 | 3.733 | 23 | 172.273 | 0.001 |
| Adequacy and efficiency of car parking provision (SF) | 180 | 1.094 | 3.722 | 24 | 142.733 | 0.001 |
| Adequacy of fire prevention provisions (SF) | 179 | 1.459 | 3.710 | 25 | 116.207 | 0.001 |
| Quality of the furniture and fittings (SF) | 177 | 1.236 | 3.706 | 26 | 115.983 | 0.001 |
| Adequacy of staff personal storage space, drawers, cabinets etc. (SF) | 183 | 1.355 | 3.705 | 27 | 156.246 | 0.001 |
| Adequacy of location and placement of fire prevention provisions, alarms, extinguisher etc. (SF) | 181 | 1.607 | 3.658 | 28 | 123.011 | 0.001 |
| Flexibility of automated equipment control to suit needs (CF) | 178 | 1.239 | 3.629 | 29 | 151.191 | 0.001 |
| Comfort and efficiency of air-conditioning systems (CF) | 180 | 1.251 | 3.628 | 30 | 131.867 | 0.001 |
| Convenience and privacy of location of telephone points (SF) | 178 | 1.461 | 3.562 | 31 | 161.236 | 0.001 |
| Efficiency of external noise prevention facilities (CF) | 181 | 1.306 | 3.541 | 32 | 114.856 | 0.001 |

| Building Performance Measurement Variables | N | Std. Deviation | Mean | Rank | Chi-square | Significance level |
|---|---|---|---|---|---|---|
| Adequacy of overall accident prevention provision (SF) | 179 | 1.354 | 3.536 | 33 | 116.341 | 0.001 |
| Ease of retrieving stored work material and records (CF) | 177 | 1.257 | 3.520 | 34 | 106.627 | 0.001 |
| Adequacy of signage and direction displays (SF) | 180 | 1.275 | 3.489 | 35 | 108.267 | 0.001 |
| Efficiency of internal noise prevention mechanism (CF) | 181 | 1.436 | 3.470 | 36 | 103.586 | 0.001 |
| Natural temperature comfort within the building (CF) | 177 | 1.243 | 3.458 | 37 | 107.373 | 0.001 |
| Efficiency of workroom (SF) | 173 | 1.427 | 3.364 | 38 | 122.595 | 0.001 |
| Comfort and cleanliness of canteen and eating facilities (CF) | 179 | 1.641 | 3.274 | 39 | 76.721 | 0.001 |
| Comfort and efficiency of sun glare prevention mechanism (CF) | 172 | 1.437 | 3.262 | 40 | 81.605 | 0.001 |
| Efficiency and adequacy of first aid provisions (SF) | 166 | 1.763 | 3.181 | 41 | 57.663 | 0.001 |
| Quality of humidity control provision (CF) | 178 | 1.515 | 3.163 | 42 | 87.888 | 0.001 |
| Adequacy of building health/ safety and protection provision (SF) | 181 | 1.573 | 3.138 | 43 | 48.227 | 0.001 |
| Comfort of lifts, elevators and escalators (CF) | 181 | 1.730 | 2.983 | 44 | 37.619 | 0.001 |
| Quality of escalators and adequacy of its safety provisions (CF) | 176 | 1.852 | 2.977 | 45 | 48.318 | 0.001 |

**$P \leq 0.01$**

The standard deviation values for the variables ranges between 0.811 and 1.730 while the average standard deviation value for all the variables is 1.258. This implies that there is some consensus in the scoring of the measures among the respondents. For example the obtained average standard deviation indicates that about 70% of the respondents scored the buildings above 2.5 (X>2.5). In greater details it means that about 35% of the respondents scored the buildings between 2.5 and 3.67 while another 35% scored them between 3,68 and 4.9. This implies that the mean value obtained is a good representation of the scorings of the performance of buildings by the respondents.

### 4.5.3 Test of Hypothesis 1: Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory

An index for building performance was developed for this study based on the respondent's rating of the building. Hence, a performance score of 1-2.5 is classified as "not satisfactory",

2.6-3.9 is “less than satisfactory”, while 4 and above is “satisfactory”. In relation to the above index, the observed average performance value of buildings in the sample (3.67) is less than the hypothesized population mean value (4) for satisfactory performance by 0.33 i.e. {(M=3.67) < (M=4) = 0.33}. However, there is a need to examine if this difference in the two values is significant enough to conclude that the mean score is significantly different from satisfactory performance or it merely resulted from random sampling. Hence, the null hypothesis that “Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory” was postulated. Table 4.10 presents the results of the one sample t test that was carried out using one sample t test.

**Table 4.10: One Sample T-Test for Significant Difference between Mean Office Building Performance Value and Test Value for Satisfactory Performance**

| | Mean | Mean Difference | T | Df | Sig | Remark |
|---|---|---|---|---|---|---|
| Test Value | 4.00 | -0.33 | -5.340 | 184 | 0.001 | Significant |
| Building Performance Value | 3.67 | | | | | |

It was found that the difference between the two mean values is statistically significant, i.e. t = -5.340 p < 0 .01 (Table 4.10). This implies that at a 99% confidence level, it can be said that the t value at the degree of freedom of 184 that was obtained is too large to have emanated from mere random variations. This translates to the fact that statistically the average performance of the buildings in this study is significantly (different from) lower than satisfactory performance. Hence, there is enough ground to reject the null hypothesis. The null hypothesis that “Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory” was therefore rejected. This implies that office buildings

in the study are performing significantly less than satisfactorily and more effort is required to make them perform satisfactorily.

## 4.6 COMPARATIVE ANALYSIS OF PERFORMANCE BETWEEN STRATEGIC AND NON-STRATEGIC FM MANAGED OFFICE BUILDINGS

According to literature, the application of strategic FM principles translates to improved effectiveness of FM service which provides a number of advantages which should expectedly translate into improved performance of the built assets.

Although FM in Nigeria is in its infancy, buildings that are managed through application of strategic FM are expected to perform significantly better than the non-strategic FM managed buildings in this study. Therefore, this section presents the result of the third objective which is "To compare the performance of office buildings which adopt strategic facilities management principles with those that do not" To achieve this objective, the performance rating of the respondents in buildings where strategic FM is adopted was compared with the performance of buildings where non-strategic FM or other traditional BSS practices were used. The interpretation of the rating is as follows: (1) not satisfactory, (2) is less satisfactory, (3) somewhat satisfactory, (4) satisfactory and (5) very satisfactory. The analysis was done by using 45 variables made up of 28 satisfaction and 17 measures of comfort. The mean value of performance for the variables for all buildings in the strategic FM category were computed and compared with those in the non-strategic FM/ traditional BSS category to determine if the performance values for these two groups of buildings are obviously different.

The results are displayed in tables 4.11 and 4.12 for the satisfaction and comfort measures respectively. The result shows that mean performance values of the satisfaction variables in the buildings where strategic FM is applied are consistently higher than in the buildings where strategic FM is not applied.

**Table 4.11: Comparison of Performance between FM and Non FM Office Buildings (Satisfaction Variables)**

| Satisfaction Performance variables | FM | Non-FM |
|---|---|---|
| | Mean | Mean |
| safety of placement of electric sockets and switches | 4.76 | 4.17 |
| quality of office equipment | 4.65 | 3.62 |
| efficiency of waste management facilities | 4.62 | 3.66 |
| adequacy of anti-theft and burglary provisions | 4.61 | 3.65 |
| overall suitability of building to organizational need | 4.56 | 3.97 |
| adequacy of overall building security provision | 4.53 | 3.58 |
| quality of furniture and fittings | 4.53 | 3.52 |
| adequacy of fire prevention provisions | 4.53 | 3.53 |
| efficiency of mains electric power and emergency power provisions | 4.53 | 3.81 |
| safety and security of doors and gates | 4.52 | 3.83 |
| efficiency and adequacy of first aid provisions | 4.47 | 2.90 |
| convenience and privacy of location of telephone points within the building | 4.45 | 3.36 |
| adequacy and convenience of location of equipment such as computer, printer etc. | 4.42 | 3.57 |
| adequacy and convenience of water supply sources including portable water | 4.41 | 3.67 |
| adequacy of location and placement of fire alarms, fire extinguisher, smoke detector etc. | 4.39 | 3.49 |
| overall level of building satisfaction | 4.38 | 3.72 |
| adequacy of staff personal storage space | 4.38 | 3.55 |
| level of office hygiene | 4.38 | 3.99 |
| efficiency of the location of each office in relation to other offices within your department | 4.33 | 3.69 |
| efficiency and comfort of office circulation/movement space and layout | 4.30 | 3.88 |
| adequacy of overall accident prevention provision | 4.27 | 3.37 |
| adequacy of the size of each office space to the work going on inside it | 4.25 | 3.81 |
| level of privacy of office and protection from internal and external distractions | 4.24 | 3.79 |
| adequacy of signage and direction displays | 4.22 | 3.33 |
| quality of lift/escalators and adequacy of its safety provisions | 4.19 | 2.71 |
| adequacy of building health and safety protection provision | 4.18 | 2.91 |
| efficiency of workroom if this is different from private offices | 4.09 | 3.19 |
| adequacy and efficiency of car parking provisions | 3.91 | 3.68 |

**4.12: Comparison of Performance between FM and Non FM Office Buildings (Comfort Variables)**

| Comfort Performance Variables | FM Mean Values | Non FM Mean Values |
|---|---|---|
| Convenience of placement of electric power sockets and switches | 4.53 | 3.97 |
| overall level of building comfort | 4.52 | 3.66 |
| efficiency of internal noise prevention mechanism | 4.47 | 3.24 |
| comfort and cleanliness of canteen and eating facilities | 4.42 | 3.01 |
| efficiency of external noise prevention facilities | 4.41 | 3.34 |
| comfort of the furniture | 4.41 | 3.66 |
| flexibility of position of furniture, fittings and equipment to suitable user's needs | 4.41 | 3.72 |
| flexibility of automated equipment control to suit needs | 4.32 | 3.47 |
| overall effect of all satisfaction and comfort on factor your ability do work within the building | 4.27 | 3.85 |
| comfort and cleanliness of sanitary facilities | 4.26 | 3.63 |
| comfort and efficiency of sun glare prevention mechanism | 4.25 | 3.04 |
| Quality of natural lighting | 4.21 | 3.83 |
| comfort and efficiency of air-conditioning systems | 4.21 | 3.49 |
| quality of humidity control provision | 4.21 | 2.92 |
| Flexibility of electric lighting to suit ambient conditions | 4.15 | 3.68 |
| ease of retrieving stored work material and records from archive | 4.12 | 3.38 |
| natural temperature comfort within the building | 4.06 | 3.32 |
| adequacy and freshness of natural ventilation | 4.03 | 3.91 |
| Comfort of lifts, elevators and escalators | 4.00 | 2.75 |

The difference in the pair of mean values for some of the variables such as "quality of office equipment" and efficiency and adequacy of first aid provisions are as high as 1.03 and 1.57 unit respectively. Similarly the mean values of the comfort variables (Table 4.12) show disparity as the mean performance values for all the variables in the strategic FM buildings are higher in each case than in the non-strategic FM buildings. While the overall mean performance of the satisfaction variables for the FM (strategic) managed buildings put them in the "satisfactory" rating i.e. 4.4, that of the non-strategic FM ones put them only in the "somewhat satisfactory" rating i.e. 3.57. Furthermore, the difference between the two mean values is as much as 0.83. In a similar vein the overall performance of the comfort variables for the strategic FM managed buildings put them in the satisfactory level (4.28) while that of

the non-strategic FM put them in the somewhat satisfactory level (3.47), while there is a similar 0.81 difference in the two performances. It is also worthy to note that while the strategic FM managed buildings were rated satisfactory (i.e. mean value ≥ 4 ) for all variables except adequacy of parking provisions, the scores for most of the variables in the non-FM managed buildings except one are in the somewhat satisfactory grade (<4). This indicates that the strategic FM managed buildings are performing much better than the non-strategic FM or traditional BSS managed buildings.

### 4.6.1 Test of hypothesis 2: No significant difference between performance of office buildings which adopt strategic facilities management principles and those that do not

To test the hypothesis that was postulated for this objective, i.e. hypothesis 2, the computed mean value of performance for the variables for all buildings in the strategic FM category were compared with those in the non-strategic FM/Traditional BSS category.

**Table 4.13: Wilcoxon Signed Rank test for significance of difference in mean performance values between the Strategic FM and non-strategic-FM office buildings (Satisfaction and Comfort variables)**

| | Satisfaction | Comfort |
|---|---|---|
| Mean | -0.83 | -0.81 |
| Z | -4.623 | -3.823 |
| Asymp. Sig. (1-tailed) | 0.001 | 0.001 |

This is to determine if the performance value for the buildings where strategic FM principles are is applied are statistically different from that of buildings where non-strategic FM principles are applied, in which case the null hypothesis $H_0$ will be rejected. Wilcoxon Signed Rank test was used to ascertain if the observed difference between the mean values of performance of these two groups of offices is significant. As displayed in Table 4.13 the

p value is significant at 99% probability for both the satisfaction and comfort categories of variables. This indicates that at 99% confidence level there is a statistically significant difference in the performance values between the strategic FM managed and the non-strategic FM managed office buildings i.e. for the satisfaction variables $z = -4.623$, $p < 0.01$, $r = -0.59$ and for the comfort variables $z = -3.823$, $p < 0.01$, $r = -0.49$. This provides enough grounds to reject the null hypothesis that *"*There is no significant difference between the performance of office buildings which adopt strategic FM principles and office buildings that do not*"* It also provided a good ground to conclude that there is a 99% certainty that the alternative hypothesis that "There is a significant difference between the performance of office buildings which adopt strategic FM principles and office buildings that do not*"* is true. This indicates that the application of strategic FM principles in the management of office buildings translates to improved performance

## 4.7 THE RELATIONSHIP BETWEEN EFFECTIVENESS OF FM AND BUILDING PERFORMANCE

This section presents the results pertaining to the fourth objective which is "To evaluate the relationship between the degree of effectiveness of facilities management service and office building performance " The first part of the section presents the analyses of data and results on the level of effectiveness of the facilities manager as rated by the respondents. The second part present the results of the attempt to identify the latent dimensions (factors) underlying these 31 soft measures of effectiveness of FM using the scorings by the respondents. Thereafter, it presents the evaluation of the relationship that exists between these key factors of FM effectiveness and building performance.

In the conceptual framework, the measures of effectiveness of FM are in three categories i.e. financial, quality of service and crises response and management categories. However, due to problems of poor financial disclosures only limited financial data were provided by the respondents. Hence in spite of the researcher's effort to encourage financial disclosure, only few answers were provided selectively. Furthermore, these data were provided only for financial performance of buildings and not financial effectiveness of the facilities manager, although it recognized that the latter can be derived from the former. Hence in view of this limitation, the financial data had to be left out of the correlation analysis done between effectiveness of FM and building performance. This is so that the volume of missing values from this aspect of the research will not reduce the robustness, adequacy and relevance of the non-financial data which have been painstakingly collected.

### 4.7.1 Non-Financial Effectiveness of FM services

Respondents were required to rate the effectiveness of the FM services in their buildings. The mean values of the respondents' ratings were obtained and thereafter ranked on the basis of the calculated mean values in a descending order. The interpretation of the rating is as follows: (1) not effective (2) is less effective, (3) somewhat effective, (4) effective and (5) very effective. The results are displayed in Table 4.14.

**Table 4.14: Level of Effectiveness of FM Services in Office Buildings in the Study**

| Measures | Mean | Std. Deviation | N | Rank |
|---|---|---|---|---|
| QS- suitability of premises and work environment to work | 3.0674 | .82746 | 178 | 1 |
| QS- friendliness and politeness of premises/FM staff | 3.0387 | .75546 | 181 | 2 |
| QS- use of quality materials in providing service | 3.0225 | .77354 | 178 | 3 |
| CR- response plan to failure in public mains water and portable water supply | 3.0169 | .95358 | 178 | 4 |
| QS- completion of project to customer satisfaction | 3.0169 | .77953 | 177 | 4 |
| QS- provision of satisfactory standard of cleaning | 3.0169 | .85354 | 178 | 4 |
| QS- provision of safe environment | 2.9769 | .90832 | 173 | 7 |
| CR- response plan to mains electricity power failure and or breakdown of alternative source of power | 2.9385 | .90045 | 179 | 8 |
| QS- achievement of completion deadlines | 2.9322 | .77308 | 177 | 9 |
| QS- competency, reliability and professionalism of the approach of premises/FM staff and their service | 2.8889 | .81802 | 180 | 10 |
| CR- plans to prevent or respond to fire and other accidents | 2.8870 | .97041 | 177 | 11 |
| QS-effective communication provision and management of information | 2.8715 | .99449 | 179 | 12 |
| QS- effective correction of faults in the building and facilities | 2.8588 | .89655 | 177 | 13 |
| CR- managing leakages from plumbing fittings and roof | 2.8287 | .95943 | 181 | 14 |
| CR- provisions for hiring qualified and reliable artisans for repair work and other projects | 2.8090 | 1.02925 | 178 | 15 |
| QS- good quality end product/ensuring value for money for work done by suppliers | 2.8034 | 1.07912 | 178 | 16 |
| QS- making sure that the building meets legislative requirements | 2.8000 | .90972 | 175 | 17 |
| QS-avoidance of loss of business due to failure in premises services | 2.7966 | .99052 | 177 | 18 |
| QS- proactive, responsive and effective FM helpdesk service | 2.7889 | 1.08822 | 180 | 19 |
| QS- effective management of maintenance functions | 2.7790 | .98646 | 181 | 20 |
| QS - provision of serene and attractive environment | 2.7722 | .95033 | 180 | 21 |
| CR- managing incidents of adulteration of materials and fake equipment parts | 2.7529 | 1.00970 | 174 | 22 |
| CR- managing the effect of hectic and unpredictable traffic situation on quality of FM service | 2.7670 | .96050 | 176 | 23 |
| QS- provision of high quality and relevant equipment | 2.7303 | .99449 | 178 | 24 |

| Measures | Mean | Std. Deviation | N | Rank |
|---|---|---|---|---|
| CR- response plan to equipment breakdown | 2.7135 | 1.24960 | 178 | 25 |
| CR- managing effect of corruption and lack of transparency on quality of service | 2.7102 | 1.03709 | 176 | 26 |
| QS- provision of good feedback and service quality review procedure | 2.7059 | .95240 | 170 | 27 |
| QS- high level of energy performance | 2.7039 | 1.02032 | 179 | 28 |
| CR- response plan to scarcity of materials and supplies | 2.6872 | 1.02354 | 179 | 29 |
| CR- managing unexpected breakdown of fixtures and fittings | 2.6833 | 1.13588 | 180 | 30 |
| QS- level of absenteeism of FM staff | 2.5000 | 1.15297 | 168 | 31 |

According to these results, suitability of premises and work environment to work is the most highly rated quality variable (rated 1st) followed by "Friendliness and politeness of premises/FM staff" (rated 2nd). "Use of quality materials in providing services" was ranked 3rd, while "response plan to failure in public mains water and potable water supply" "Provision of satisfactory standard of office cleaning" and "completion of project to customer satisfaction" were all ranked 4th while "Provision of safe environment" was ranked 7th. It was found that six (6) out of the ten (10) least performing variables belongs to the crises response and management category.

This implies that in comparison, BSS providers are not performing well in the crises response and management responsibilities and are doing better in the quality of service ones. A further indication of the lower performance in this category of variables is the finding that only two of the variables that were ranked in the top ten positions belonged to the crises response and management category. These are "response plan to failure in public mains water and potable water supply" and "response plan to mains electricity power failure and or

breakdown of alternative source of power". These two measures are public service emergency measures that are probably given priority by the BSS providers on the recognition that the adverse effect of their non-performance could be readily noticeable in any organisation.

The first two top rated crises response and management measures have been indicated. These are followed by "Managing effect of severe weather" (rated 3$^{rd}$) and "Prevention and response plans to fire and other accidents" (rated 4$^{th}$). According to the respondents the four least effective "response to crises" work areas of the BSS providers are; "Managing unexpected breakdown of fixtures and fittings" (rated last i.e. 12$^{th}$), followed by "Response plan to equipment breakdown" (11$^{th}$), "Response plan to scarcity of materials and supplies" (10$^{th}$) and "Managing effect of corruption and lack of transparency on quality of service" (9$^{th}$). These four measures are related to poor regulatory policies and standards enforcement and suggest that the quality of this aspect of FM is quite unsatisfactory.

The respondents also indicated the following as the five least effective areas of the BSS providers service in the "quality of service" category; "Effective management of maintenance functions" (ranked 16$^{th}$), "Provision of high quality and relevant equipment" (17$^{th}$), "High level of energy performance" (18$^{th}$), "Provision of good feedback and service quality review" (19$^{th}$) and Level of absenteeism of FM staff (ranked 20$^{th}$). These are issues of infrastructure and maintenance, therefore indicating that office building users perceive the infrastructural provisions and maintenance activities of BSS providers as inadequate. Only the first six out of the 31 variables used in this study, are rated at least 3 ($X \geq 3$), which is the score for "somewhat satisfactory" level of effectiveness. This implies that most of the

variables are rated as unsatisfactory by the respondents. This result shows that the level of effectiveness of FM services in the office buildings in the study area is generally less than satisfactory.

The overall mean value for the "quality of service category" of variables is 2.86 while that of the "crises response and management" category is 2.80. The average for the two categories of measures is 2.83. These values are all within the "not satisfactory" scale (i.e. $2 \leq X \leq 3$), meaning that they are not even at the somewhat satisfactory range, a situation which leaves a lot to be desired. It is worthy of note that these mean values can equally serve as useful industrial benchmarks against which a building's BSS provider could benchmark the quality of its services. Such benchmark has the facility to either benchmark "quality of service" and "crises response and management aspects of quality" separately or together as overall performance.

### 4.7.2 Key Latent Dimensions (Factors) Underlying the FM Effectiveness Measures

This section presents the analysis and results of the attempt to identify important or latent dimensions underlying the various measures of FM effectiveness (31 in all) that were used in this study. It also presents the result of the attempt to determine the relationship between these key factors and the dependent variable (building performance) using multiple correlation analysis.

The justification for the use of key dimensions of effectiveness of FM in establishing the relationship between the dependent and the independent variables rather than use of all 31 variables has been provided under section 3.13 (data analysis) of the chapter on research

method. Underlying dimensions in a set of several interrelated variables are known as factors and they underlie certain constructs such as the one in this study i.e. effectiveness of FM. The appropriate key dimensions were therefore identified through factor analysis, using the principal component analysis (PCA) method. Factor analysis explains the maximum amount of common variance in a correlation matrix using the smallest number of variables (Field, 2009). In this study the factor analysis was done separately for each of the two categories of variables. This is to prevent a situation where the important latent dimensions in one category get subsumed under those in the other category.

The first step of the factor analysis is to determine the factorability of the sample and data available. Sample size and data that do not meet necessary factorability criteria should not be used in factor analysis otherwise the results could be very misleading. Factorability test was done using four recognized methods the first of which is to determine the adequacy of sample for this work by comparing the ratio of the number of variables with the sample size or cases. Kass and Tinley (1979) recommend having at least between 5 and 10 participants per variable, but an absolute minimum of 5. For this study there are 187 cases (User respondents) which translate to 9.4 and 17 participants per variable for the quality of service and crises response and management categories respectively. This is considered quite adequate. The second test is that of Keiser Meyer Olkin (KMO), also a test of sampling adequacy. KMO measures the ratio of squared correlation between variables to the squared partial correlation. A value of zero indicates that the partial correlation is large relative to the sum of correlation and is an indication that the data may not be suitable for factor analysis. A value closer to one (1) should yield distinct and reliable factors (Field, 2009). Keiser (1974)

cited in Field (2009) recommends that a KMO of 0.5 to 0.7 are mediocre values, those between 0.7 and 0.8 are good, above 0.8 to 0.9 are very good while above 0.9 are superb.

**Table 4.15a: KMO and Bartlett's Test for Quality of Service Variables**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0.928 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1941.513 |
| | Df | 190 |
| | Sig. | .001 |

**Table 4.15b: KMO and Bartlett's Test for crises Response and Management Variables**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0.914 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1031.435 |
| | Df | 66 |
| | Sig. | .001 |

Table 4.15a & b provides details of the KMO tests performed on the data obtained on the two categories of variables used in this study. The table shows that the KMO values are 0.928 and 0. 914 for the quality of service and the crises response and management data respectively which indicates that the sampling adequacy of the two sets of data are almost perfect.

The third test of factorability that was conducted in this study is Bartlett’s test of sphericity. This was used to test the null hypothesis that the original correlation matrix in the study is an identity matrix (zero correlation). An identity matrix is a matrix with zero correlation and is not suitable for factorization as variables need to have some form of correlation in order for

factorization to be applicable. Table 4.15a&b confirms that at 99% percent probability the two sets of correlation matrices are not identity matrices. However, the variables must not correlate too strongly which leads to the fourth factorability test i.e. multicollinearity test. Data for factor analysis must not correlate too highly (multicollinearity).

**Table 4.16: Table of Correlation Matrix of the Crises Response and Management Variables**

| | CRV1 | CRV2 | CRV3 | CRV4 | CRV5 | CRV6 | CRV7 | CRV8 | CRV9 | CRV10 | CRV11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CRV1 | 1.000 | | | | | | | | | | |
| CRV2 | .394 | 1.000 | | | | | | | | | |
| CRV3 | .342 | .410 | 1.000 | | | | | | | | |
| CRV4 | .342 | .402 | .486 | 1.000 | | | | | | | |
| CRV5 | .426 | .516 | .479 | .574 | 1.000 | | | | | | |
| CRV6 | .305 | .440 | .432 | .567 | .642 | 1.000 | | | | | |
| CRV7 | .388 | .556 | .487 | .536 | .706 | .698 | 1.000 | | | | |
| CRV8 | .347 | .305 | .453 | .470 | .411 | .382 | .431 | 1.000 | | | |
| CRV9 | .367 | .465 | .485 | .535 | .509 | .485 | .583 | .470 | 1.000 | | |
| CRV10 | .348 | .441 | .357 | .440 | .500 | .520 | .547 | .478 | .740 | 1.000 | |
| CRV11 | .347 | .512 | .290 | .470 | .564 | .534 | .611 | .387 | .603 | .668 | 1.000 |

Multicollinearity can be detected by examining the determinant of the R matrix generated by correlating the variables against each other. Any two sets of variables that display high correlation of more than 0.9 (X > 0.9) should be removed from the data before commencing with factorization. Tables 4.16 and 4.17, shows the correlation matrices for the crises response and management variables and quality of service variables respectively. None of the variables in the correlation matrices shows multicollinearity.

The highest determinant of R matrix for the quality of service variables is 0.698 (Table 4.16) while that of the crises response and management variables is 0.740 (Table 4.17). These two values are much less than the 0.9 criterion for multicollinearity. This implies that the data for this study is considered quite adequate for factorability with respects to all four tests

### 4.7.3 Factorization of the Effectiveness of FM Measures

The next step of the analysis involves determining how many factors to extract after the correlation. There are two recognized ways of selecting factors in a data. These are Kreiser's criterion and Cartell's scree plot. Keiser's criterion recommends the extraction of every component or factor that has eigenvalue of at least 1 ($X \geq 1$). Cartell plots the successive eigenvalue in the data in a descending order and identifies the point where the plot abruptly levels out or drops i.e. point of inflection (Darlington, 2004). The number of factors before this point is the number of factors to extract. The quality of service PCA identified three factors with eigenvalue of more than 1. This suggests that three (3) components should be extracted using Keiser's criterion.

**Table 4.17: Correlation Matrix of the Effectiveness of FM Service Variables**

| | QS1 | QS2 | QS3 | QS4 | QS5 | QS6 | QS7 | QS8 | QS9 | QS10 | QS11 | QS12 | QS13 | QS14 | QS15 | QS16 | QS17 | QS18 | QS19 | QS20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QS1 | 1.000 | | | | | | | | | | | | | | | | | | | |
| QS2 | .489 | 1.000 | | | | | | | | | | | | | | | | | | |
| QS3 | .317 | .571 | 1.000 | | | | | | | | | | | | | | | | | |
| QS4 | .226 | .402 | .439 | 1.000 | | | | | | | | | | | | | | | | |
| QS5 | .407 | .455 | .596 | .619 | 1.000 | | | | | | | | | | | | | | | |
| QS6 | .486 | .287 | .378 | .330 | .523 | 1.000 | | | | | | | | | | | | | | |
| QS7 | .427 | .441 | .403 | .360 | .477 | .397 | 1.000 | | | | | | | | | | | | | |
| QS8 | .408 | .506 | .408 | .309 | .409 | .292 | .650 | 1.000 | | | | | | | | | | | | |
| QS9 | .351 | .447 | .495 | .455 | .526 | .341 | .635 | .628 | 1.000 | | | | | | | | | | | |
| QS10 | .530 | .637 | .471 | .440 | .523 | .482 | .583 | .599 | .698 | 1.000 | | | | | | | | | | |
| QS11 | .476 | .555 | .467 | .380 | .472 | .479 | .554 | .591 | .599 | .741 | 1.000 | | | | | | | | | |
| QS12 | .400 | .499 | .316 | .395 | .372 | .348 | .459 | .494 | .569 | .643 | .613 | 1.000 | | | | | | | | |
| QS13 | .358 | .414 | .267 | .276 | .404 | .395 | .331 | .295 | .321 | .456 | .337 | .422 | 1.000 | | | | | | | |
| QS14 | .509 | .467 | .429 | .446 | .583 | .617 | .518 | .460 | .510 | .635 | .624 | .555 | .525 | 1.000 | | | | | | |
| QS15 | .420 | .481 | .458 | .440 | .492 | .517 | .383 | .372 | .524 | .638 | .608 | .515 | .451 | .620 | 1.000 | | | | | |
| QS16 | .356 | .455 | .454 | .482 | .562 | .437 | .440 | .482 | .520 | .570 | .561 | .431 | .406 | .562 | .622 | 1.000 | | | | |
| QS17 | .348 | .365 | .328 | .329 | .487 | .447 | .466 | .493 | .491 | .579 | .447 | .392 | .473 | .548 | .557 | .537 | 1.000 | | | |
| QS18 | .307 | .339 | .320 | .329 | .436 | .385 | .506 | .476 | .539 | .539 | .450 | .484 | .397 | .577 | .438 | .434 | .530 | 1.000 | | |
| QS19 | .390 | .471 | .468 | .356 | .505 | .537 | .448 | .448 | .531 | .579 | .610 | .450 | .543 | .581 | .584 | .477 | .654 | .563 | 1.000 | . |
| QS20 | .364 | .389 | .169 | .332 | .358 | .357 | .330 | .248 | .250 | .337 | .310 | .389 | .447 | .391 | .299 | .364 | .319 | .391 | .363 | 1.000 |

**Table 4.18: Initial Eigenvalues of the Quality of Service Components**

| Component | Initial Eigenvalues | | |
|---|---|---|---|
| | Total | Percent of Variance | Cumulative Percentage of Variance |
| 1 | 9.823 | 49.114 | 49.114 |
| 2 | 1.253 | 6.264 | 55.378 |
| 3 | 1.116 | 5.578 | 60.956 |

As displayed in Table 4.18 the first component explains a linear variation of 9.823, the second, 1.253, and the third, 1.116. The percentage of the variations in all the variables explained by these factors are, 49.11%, 6.26%, and 5.58% for the first, second and third components respectively. The first component explained the highest linear variation among others. However, these three components could together explain a linear variation of almost 61% of the variations in all other variables which is quite substantial, and makes the result quite reliable. According to Field (2009) Keiser's criterion is accurate where variables are less than 30, where the average communality after extraction is greater than 0.7 and where the sample size exceeds 250. He recommends that where one or more of these criteria are not met as is the case with this study, it is preferable to determine the number of factors to be extracted using a combination of Keiser's criterion and Cartell's Scree plot.

Figure 4.4 presents the scree plot that was used in combination with Keiser's criterion. The plot indicates a first major point of inflection on the fourth component, indicating that the three factors before the inflection should be extracted. This supports the number of factors indicated by Keiser's criterion and implies that the choice of three factors to represent the 20 quality of service variables that were used in the study is a good one.

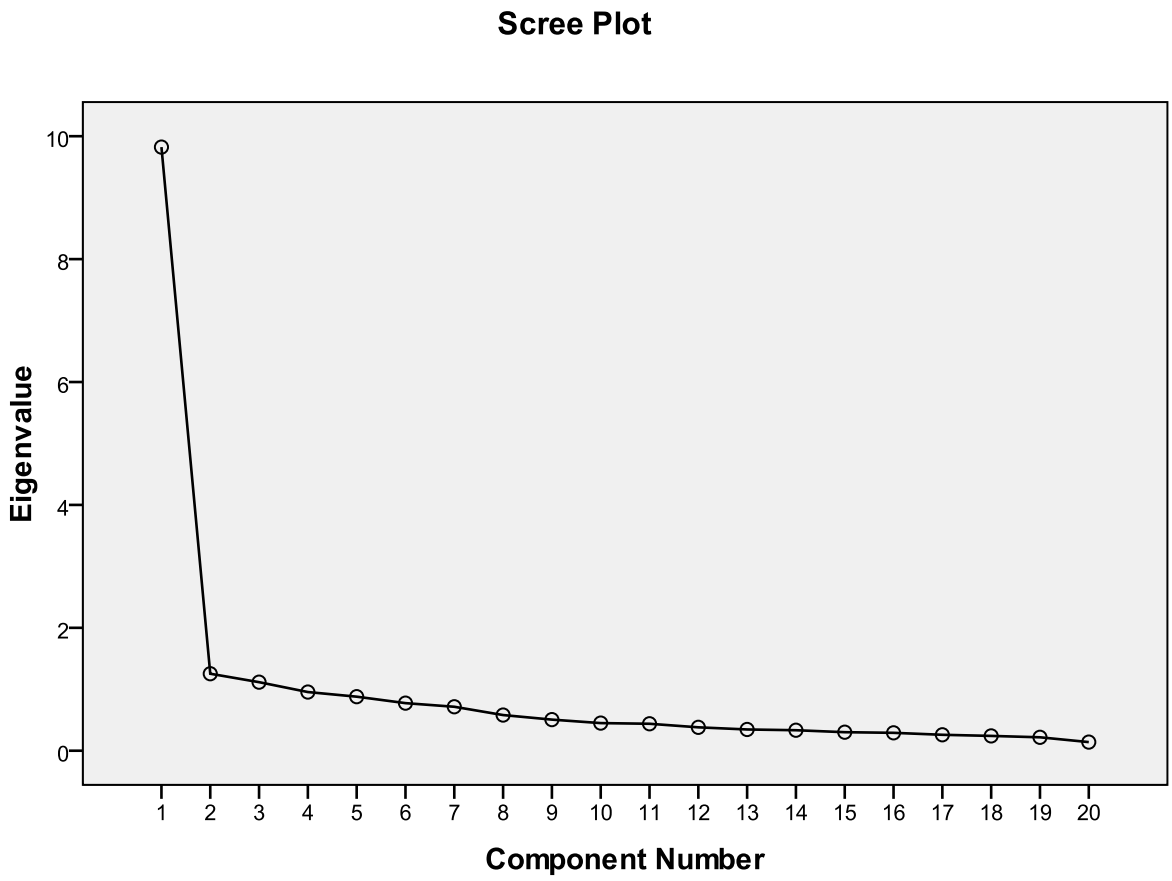



***Figure 4.4: Scree plot for the Quality of Service variables***

In view of this indication, the component matrices were rotated on three factors. Factor rotations improves the loading of the variance on each factor as it optimizes the factor structure and spreads out the variance rather than concentrating it on one factor as in the un-rotated extraction. Table 4.19 displays an obviously improved spread in the variations explained by each of the three extracted factors as compared to what they were in Table 4.18 before the rotation. In the previous table the first factor explained about 49% of the 61% variations of the three factors, however after rotation the first factor explained about 24%. The post rotation total variation accounted for by the three factors remains unchanged at

about 61%. Factor rotation also makes it easier to identify the variables that load heavily on each factor. The loading of each component on the factor can be determined from its component matrix. The larger a variable's component matrix is, the larger the variation in that variable that is explained by the factor.

**Table 4.19: Total Variance Explained after Rotation**

| Component | Rotation Sums of Squared Loadings | | |
|---|---|---|---|
| | Total | % of Variance | Cumulative % |
| 1 | 4.769 | 23.846 | 23.846 |
| 2 | 4.142 | 20.709 | 44.555 |
| 3 | 3.280 | 16.401 | 60.956 |

Extraction Method: Principal Component Analysis.

The results of the rotation of the three principal components are displayed in Table 4.20. It indicates that the three factors have highly loaded (coefficients) items. This is an indication that the number of factors that were extracted is sufficient. On the first component, provision of safe environment is highly loaded with a high value of 0.823, followed by provision of satisfactory standard of cleaning, with 0.743 and provision of serene and attractive environment with 0.720.

On the second factor, good quality end product/ensuring value for money for work done by suppliers load highly with a value of 0.744. While on the third factor, achievement of completion deadlines was most highly loaded with a value of 0.755, followed by friendliness and politeness of the premises/FM staff and competencies and professionalism with high loadings of 0.746 and 0.741, respectively.

**Table 4.20: Component Matrix after Extraction Showing Loading of the Variables**

| Rotated Component Matrix | Components 1 | 2 | 3 |
|---|---|---|---|
| Provision of safe environment | .823 | | |
| Provision of satisfactory standard of cleaning | .743 | | |
| Provision of serene and attractive environment | .720 | | |
| Provision of high quality and relevant equipment | .701 | | |
| Effective management of maintenance functions | .677 | | |
| Suitability of premises and work environment to work | .628 | | |
| Making sure that the building meets legislative requirements | .518 | | |
| Completion of project to customer satisfaction | .508 | | |
| Good quality end product/ensuring value for money for work done by suppliers | | .744 | |
| Level of absenteeism of FM staff | | .665 | |
| Proactive, responsive and effective FM helpdesk service | | .648 | |
| Effective correction of faults in the building and facilities | | .628 | |
| Provision of good feedback and service quality review procedure | | .603 | |
| High level of energy performance | | .567 | |
| Use of quality materials in providing service | | .509 | |
| Avoidance of loss of business due to failure in premises services | | | |
| Achievement of completion deadlines | | | .755 |
| Friendliness and politeness of premises/FM staff | | | .746 |
| Competency, reliability and professionalism of the approach of premises/FM staff and their service | | | .741 |
| Effective communication provision and management of information | | | .529 |

Using the theme of the variables that load highly on each factor a name was given to the factors. Hence the three qualities of service factors were given the following names and abbreviations:

Factor 1 (Safe, Clean Attractive and Functional work Environment- SCAFE)

Factor 2 (Good quality end product – GQP) and

Factor 3 (Timeliness and Professionalism of FM staff- TP)

### 4.7.4 Factorization of the Crises Response and Management variables

The initial component matrix for the crises response and management variables shows that only one component has eigenvalues of at least 1 ($X \geq 1$). This implies that using Keiser's criterion only one factor should be extracted. This single component explains 52.43% linear variation, but in the realization that the second component also explains a sizeable 7.83% linear variation although its eigenvalue was less than one, it was considered for extraction. This also indicates that there might be a need to use another method to determine the number of factors for extraction, more so, as the criteria for the use of Keiser's criterion were not all met.

**Table 4.21: Initial Eigenvalues of the Crises Response and Management Components**

| Component | Initial Eigenvalues | | |
|---|---|---|---|
| | Total | Percent of Variance | Cumulative Percentage of Variance |
| 1 | 6.292 | 52.434 | 52.434 |
| 2 | 0.940 | 7.833 | 60.267 |

For these reasons Cattell's Scree plot was used as an alternative method for extracting the appropriate number of components. The plot indicates a first point of inflection on the third component (Figure 4.5), implying that unlike Keiser's criterion two components should be extracted. Hence, two factors were extracted for this set of variables using a combination of Keiser's criterion and Cattel's Scree plot. With the extraction of two factors the total variation explained by the two components amounted to approximately 60% (Table 4.21)

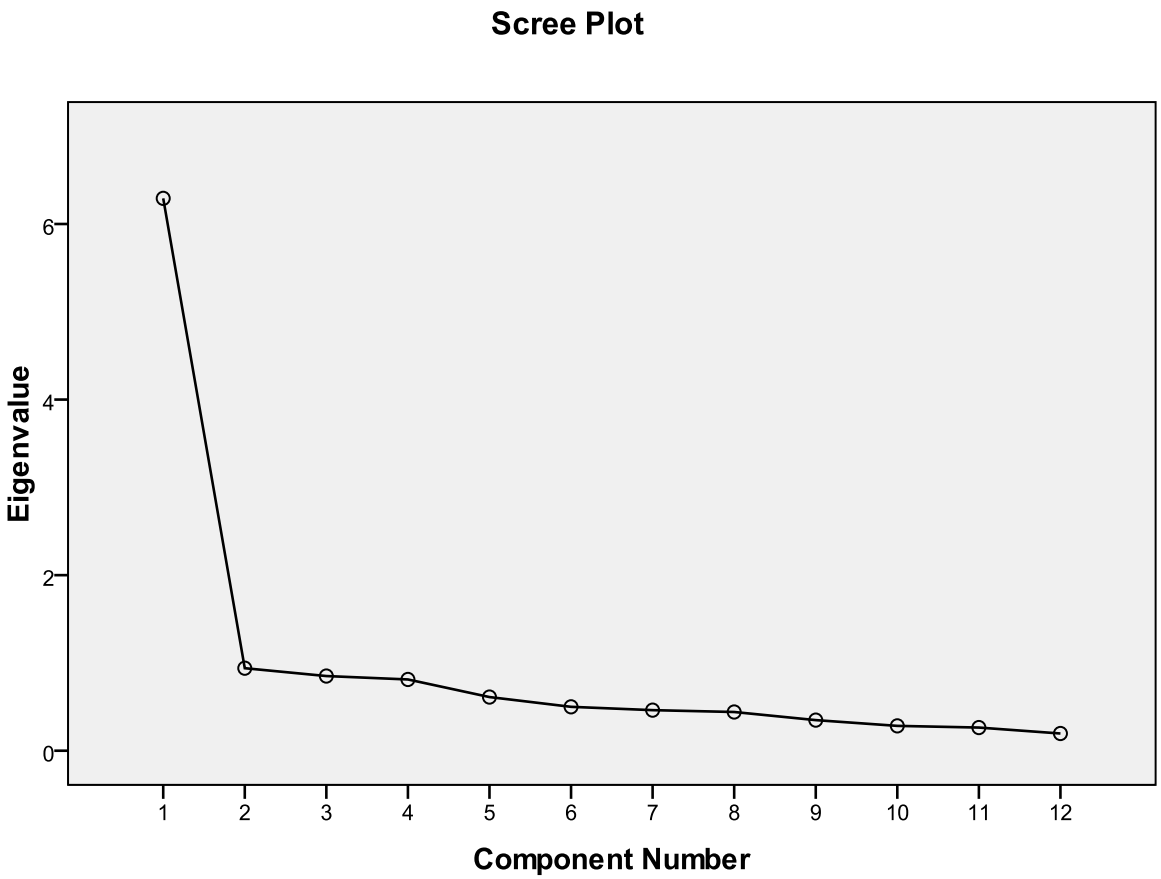



***Figure 4.5: Scree plot of the Crises Response and Management Variables***

The two components that were rotated and the variables that load on them are displayed in Table 4.22. Plans to prevent or respond to fire and other accidents is the most highly loaded variable on the first component with a component matrix of 0.842, followed by Managing leakages from plumbing fittings and roof and Response plan to failure in public mains water and portable water supply with a matrix of 0.788 and 0.786 respectively. Managing incidents of adulteration of materials and fake equipment parts loaded most highly on the second components followed by Managing the effect of hectic and unpredictable traffic situation on quality of FM service with 0.824 and 0.728.

**Table 4.22: Rotated component matrixes of the two crises response and management components (Factors)**

| Rotated Component Matrix | Components 1 | Components 2 |
|---|---|---|
| Plans to prevent or respond to fire, safety, health, accidents and other emergencies | .842 | |
| Managing leakages from plumbing fittings and roof | .788 | |
| Response plan to failure in public mains water and portable water supply | .786 | |
| Managing unexpected breakdown of fixtures and fittings | .635 | |
| Response plan to mains electricity power failure and or breakdown of alternative source of power | .555 | |
| Managing incidents of adulteration of materials and fake equipment parts | | .824 |
| Managing the effect of hectic and unpredictable traffic situation on quality of FM service | | .728 |
| Response plan to scarcity of materials and supplies | | .656 |
| Provisions for hiring qualified and reliable artisans for repair work and other projects | | .626 |
| Response plan to equipment breakdown | .549 | .621 |
| Managing effect of corruption and lack of transparency on quality of service | | .587 |

Using the themes of the variables that load heavily on the two factors, the crises response and management factors were named as follows;

Factor 1 (Response plan to public and building service emergencies - PBSE) and

Factor 2 (Response plan to poor regulatory policies and standards enforcements – PRSE)

Hence this study identified five key factors as, latent dimensions of the effectiveness of FM construct.

### 4.7.5 Relationship between effectiveness of FM and Building performance

The factor loadings of the five extracted components are used in a multiple correlation analysis (Pearson's correlation analysis) with the mean value of office building performance that was obtained from this study in objective two using 45 different building attributes. The five factors represent the independent variables (predictors) while building performance value is the dependent variable (outcome). The result shows that all five predictors are highly and positively correlated to the dependent variable with a joint correlation coefficient of 0.793 (R = 0.793). According to Field (2009), a 0.1 correlation is low effect, 0.3 is medium and 0.5 is large. Therefore the almost 0.8 correlation of the independent variables with the dependent variable in this study is very large.

### 4.7.6 Testing of Hypothesis 3: No significant relationship between effectiveness of facility management and office building performance.

To test the main hypothesis that is relevant to this aspect of the study, hypothesis 3 i.e. "this correlation coefficient was subjected to a significance test at 99% and was found to be significant i.e. R=.793, $p < .01$. This confirms that there is a 99% certainty that the relationship that is found between the independent and dependent variables in this study sample is real i.e. it exists in the population. Hence the result provides us with enough grounds to reject the null hypothesis. According to Field (2009) where there is enough grounds to reject the null hypothesis you do not accept the alternative hypothesis, it only means you have certainty of a given probability (depending on the probability level) that the alternative hypothesis is true. Therefore this result provided enough certainty (99%) to state that the alternative hypothesis that "There is a significant relationship between facility management quality and office building performance" is true.

To fulfil the objectives of this study hypothesis 3 was divided into two parts to cover each category of the soft variables. Five further sub-hypotheses were postulated from these two main sub-hypotheses to cover each dimension of effectiveness of FM. The two main sub-hypothesis that were postulated and the five further sub-hypotheses that were developed from them are stated as follows;

***Sub- Hypotheses***

$H_{03\,(1)}$ The effectiveness of FM service in office buildings in Lagos metropolis do not have significant relationship with the performance of the buildings

$H_{03\,(2)}$ The effectiveness of the crises response and management ability of FM service in office buildings in Lagos metropolis does not have significant relationship with the performance of the buildings

***Further-Sub-Hypotheses***

$H_{031\,(1)}$ There is no significant relationship between the facilities manager's ability to provide Safe, Clean and attractive work Environment and office building performance"

$H_{031\,(2)}$ "There is no significant relationship between good quality end product from the facilities manager and office building performance"

$H_{031\,(3)}$ "There is no significant relationship between Timeliness and Professionalism of the facility manager and office building performance"

$H_{032\,(4)}$ "There is no significant relationship between facility managers' response plan to public and building service emergencies and office building performance"

$H_{032\,(5)}$ "There is no significant relationship between facility managers' response plan to poor regulatory policies and standards enforcements and office building performance"

The outcome of the correlation analyses that were done for the five further, sub-hypotheses are shown in Table 4.23. The results indicate that for three variables i.e. SCAFE, PSBE and PRPSE there were large correlations with r values of .522, .523 and .501 respectively. For the last two variables i.e. GQP and TP there were medium correlations with r values of .442 and 389 respectively. This indicates that each of the predictors (key measures or dimensions) of FM effectiveness has medium to large relationship with office building performance. The interpretation of this is as follows;

1 unit improvement in SCAFE = 0.52 increase in building performance (BP)

1 unit improvement in GQP = .44 increase in BP

1 unit improvement in TP of FM = 0.39 increase BP

1 unit improvement in PSBE = 0.52 increase in BP

1 unit improvement in PRPSE = 0.5 in BP.

**4.23: Pearson Correlation Analysis of the Key Factors of Effectiveness of FM and Office Building Performance**

| **Key Factors of Effectiveness of FM** | **Building Performance** | | | |
|---|---|---|---|---|
| | N | Correlation Coefficient | Significance level | Remark |
| Safe, Clean, Attractive and Functional Environment (SCAFE) | 137 | 0.522 | 0.001** | Strong correlation Exits |
| Good Quality End Product (GQP) | 137 | 0.442 | 0.001** | Medium " |
| Timeliness and Professionalism (TP) | 137 | 0.389 | 0.001** | Medium " |
| Response plan to public service and building emergencies (PSBE) | 151 | 0.523 | 0.001** | Strong " |
| Response plan to poor regulatory policies and poor standards enforcement (PRPSE) | 151 | 0.501 | 0.001** | Strong " |

**** = P < 0.01**

The results indicate that the correlation in each case is significant at 99% i.e. SCAFE ($r = .522$, $p < .01$); GQP ($r = .442$. $p < .01$); TP ($r = .389$ $p < .01$); PSPE ($r = .523$ $p < .01$) and PRPSE ($r = .501$ $p < .01$). This implies that the medium to strong relationship that was indicated between each independent variable and the dependent variable is found to be real

in the population and not just in this sample i.e. it is not merely a result of random variation. Hence the result provides us with enough grounds to reject all five null sub-hypotheses and provided enough ground to state that all five alternative hypotheses stated below are true with 99% certainty.

$H_{031\ (1)}$ There is a significant relationship between the facilities manager's ability to provide Safe, Clean, attractive and Functional work Environment and office building performance"

$H_{031\ (2)}$ "There is a significant relationship between good quality end product from the facilities manager and office building performance"

$H_{031\ (3)}$ "There is a significant relationship between Timeliness and Professionalism of the facility manager and office building performance"

$H_{032\ (4)}$ "There is a significant relationship between facility managers' response plan to public and building service emergencies and office building performance"

$H_{032\ (5)}$ "There is no significant relationship between facility managers' response plan to poor regulatory policies and standards enforcements and office building performance"

In view of this it can be concluded that the two alternative sub-hypotheses from which the five sub-hypotheses above were developed are also true i.e. $H_{03\ (1)}$ "Quality of FM service in office buildings in Lagos metropolis has significant relationship with the performance of the buildings" and $H_{03\ (2)}$ Crises response and management ability of FM service in office buildings in Lagos metropolis has significant relationship with the performance of the buildings.

## 4.8 A MODEL FOR PREDICTING PERFORMANCE VALUE OF OFFICE BUILDINGS FROM FM EFFECTIVENESS

### 4.8.1: Developing the Model

This section presents the result of objective five which is "To develop a model for predicting the relationship between facilities management service and office building performance" The model builds on the relationship which is established between the measures of effectiveness of FM (independent variables) and office building performance value (dependent variable) in objective four. Correlational analysis could establish the existence of a positive or negative relationship or effect between two variables but it cannot establish a causal effect, which must exist for one variable to be predictable from the other. A causal relationship can only be established through regression analysis (Field, 2009). In view of the foregoing, regression analysis was applied in this study to determine the possible existence of a predictive relationship between the independent and dependent variables.

Earlier on in objective four, using factor analysis, five independent variables (factors) were identified as the important latent dimensions that underlie the 31 measures of effectiveness of FM construct that were used. These same five factors were used as the independent variables for the analysis in this section, while the mean building performance value that was obtained in objective 2 from all 45 measures that were used in the study represents the dependent variable. As there is more than one dependent variable this study used multiple regression analysis. The factor loadings of the five factors were obtained directly from CPA in the factor analysis and used in the model.

**Table 4.24: Correlation Matrix of the Independent and Dependent Variables**

| | BDP |
|---|---|
| **BDP** | 1.000 |
| **SCAFE** | 0.522*** |
| **GQP** | 0.442*** |
| **TP** | 0.389*** |
| **PSBE** | 0.523*** |
| **PRPSE** | 0.501*** |

*** Significant at 1%

The correlation matrix of all variables in the regression analysis is shown in Table 4.24. The result indicates that the five independent variables (predictors) are positively and significantly correlated with the dependent variable (outcome) at 99% probability. A coefficient of determination value of 0.629, ($R^2$=0.629) was obtained. This represents the degree of variation in the dependent variable that could be attributed to the independent variable and implies that effectiveness of FM is responsible for about 63% of the variation in office building performance. It also means that every unit improvement in effectiveness of FM would bring about a 0.63 unit improvement in building performance. According to Field (2009), Cohen (1988, 1992) has made some widely accepted suggestions about what constitutes a large effect as follows:

$.10 \leq r \geq .30$, meaning the effect explains between 1% and 9% of the total variation in the outcome is small effect

$.30 \leq r \geq .50$ meaning the effect explains between 9% and 25% of the total variation in the outcome is medium effect while

$r > .50$ meaning the effect explains more than 25% of the total variation in the outcome is large or strong effect.

Hence the 63% variation observed in this case represents a very strong effect, but its significance is better indicated through the F ratio. The F ratio is a measure of how much the model has improved the prediction of the dependent variable compared to the level of inaccuracy in the model. If a model is good the F ratio should not only be large but should be significantly large as indicated by a hypothesis testing using ANOVA test of F ratio.

### 4.8.2 Test of Hypothesis 4: The Effectiveness of Facilities Management is not a Significant Predictor of Performance of Office Buildings

The indication that each independent variable has a reasonable percentage of unique contribution to the dependent variable is a good one. However, for a variable to significantly predict an outcome then it should have a β value that is significantly different from zero as indicated by the ANOVA ratio test. This test is capable of not only indicating if the β value of a variable is significantly more than zero it also takes the β values beyond the sample to the population thereby indicating if the sample is a representative of the population (Field, 2009). Hence, we test the hypothesis that the variation in the outcome (building performance) that the predictor (effectiveness of FM) accounts for is not significant.

**Table 4.25: ANOVA Ratio Test of the Multiple Regression Analysis**

| | Sum of Squares | Degree of freedom | Mean Square | F- ratio | Significant |
|---|---|---|---|---|---|
| Regression | 54.571 | 5 | 10.914 | 39.998 | 0.001 |
| Residual | 32.199 | 118 | .273 | | |
| Total | 86.770 | 123 | | | |

R = 0.793;$R^2$ = 0.629; Adj. $R^2$= 0.613; Durbin-Watson =2.105

The hypothesis was tested by subjecting the F ratio of the coefficient of determination value ($R^2$ = 0.629) of the multiple regression analysis to ANOVA test at 99% significance level. The result as displayed in Table 4.25, indicates that the probability of getting an F value that is as large as 39.998 is less than 0.1% i.e. $R^2$ =.629, $p < .01$. Therefore, it can be concluded that the model provides a significantly better prediction of Building Performance Value compared to if we used the model of the mean of the respondents scoring in predicting building performance value. This indicates that the independent variable (effectiveness of FM) is a significant predictor of the dependent variable, building performance (Robson, 2002 and Field, 2009). This result provides a good ground to reject the null hypothesis, while being 99% certain that the alternative hypothesis is true that "the effectiveness of facilities management is not a significant predictor of performance of office buildings"

To fulfil the objectives of this study hypothesis 4 was divided into two parts to cover each category of the soft measures of FM effectiveness. Five sub-hypotheses were further postulated from these two sub-hypotheses. The two sub-hypothesis that were postulated and the five other sub-hypotheses that were developed from them are stated as follows:

***Sub Hypotheses 4***

$H_{04\,(1)}$ The quality of FM service in office buildings is not a significant predictor of their performance"

$H_{04\,(2)}$ Crises response and management ability of FM service in office buildings is not a significant predictor of their performance"

***Further Sub-Hypotheses***

$H_{041\ (1)}$ "The facilities manager's ability to provide a safe, clean, attractive and functional work environment is not a significant predictor of office building performance"

$H_{041\ (2)}$ "Good quality end product is not a significant predictor of office building performance"

$H_{041\ (3)}$ "Timeliness and Professionalism of the facility manager is not a significant predictor of office building performance"

$H_{042\ (4)}$ "The facility managers' response plan to public and building service emergencies is not a significant predictor of office building performance"

$H_{042\ (5)}$ "The facility managers' response plan to poor regulatory policies and standards enforcements is not a significant predictor of office building performance"

The outcome of the significance tests for the t values of the coefficient of determination (β) that were obtained for each independent variable can be found in Table 4.26. The $\beta_0$ is the constant which represents the value that the dependent variable would be where the independent variable has a value of zero. The regression coefficient ($\beta_1$ to $\beta_n$) is the intercept (variation explained) of the dependent variables. A positive $\beta_1$ represent a positive contribution and a negative $\beta_1$ represents a negative contribution. It was found that the β values for the three independent variables that represent the "quality of service measures" are all significant at 99% i.e. SCAFE (B = .372, $p < .01$); GQP (B =. 309, $p < .01$); TP (B = .231 $p < .01$). While the β values for one of the two "crises response and management" variables is significant at 95%, the other one was significant at 90% i.e. PSBE (B = .120 $p < .1$) and PRPSE (B = .501 $p < .05$).

**Table 4.26: β and Standardized Beta Values and Significance of the contribution of the Independent Variables to the Dependent Variable**

| Independent Variable | β | Stand-ardized Beta | Std. Error | T | Significan-ce Level | Remark |
|---|---|---|---|---|---|---|
| Constant | 3.602 | | 0.048 | 75.611 | 0.001 | Sign *** |
| Safe, Clean, Attractive and Functional (SCAFE) Work Environment | 0.372 | 0.434 | 0.063 | 5.871 | 0.001 | Sign *** |
| Good Quality End Product (GQP) | 0.309 | 0.331 | 0.069 | 4.455 | 0.001 | Sign *** |
| Timeliness and Professionalism (TP) | 0.231 | 0.268 | 0.059 | 3.929 | 0.001 | Sign *** |
| Response plan to public service and building emergencies (PSBE) | 0.120 | 0.134 | 0.071 | 1.690 | 0.094 | Sign * |
| Response plan to poor regulatory policies and poor standards enforcement (PRPSE) | 0.144 | 0.164 | 0.068 | 2.123 | 0.036 | Sign ** |

Dependent variable= Building Performance (BPV)
*= sign at 0.1, ** = at 0.05, *** = sign at 0.01

These results indicate that the β values and hence the ability of each of these independent variables to predict the dependent variable (outcome) is significantly different from zero. It also implies that the effect of each independent variable on the dependent variable is not merely as a result of random variation and can be found to be real in the population and not just in this sample (Field, 2009). Hence the result provided enough grounds to reject all five null hypotheses and enough certainty to state that all five alternative hypotheses stated below are true (at 99% certainty level for the first three sub-hypotheses; 95% for the fourth and 90% for the fifth).

$H_{041\ (1)}$ "Safe, Clean, attractive and Functional work Environment is a significant predictor of office building performance"

$H_{041\ (2)}$ "Good quality end product is a significant predictor of office building performance"

$H_{041\ (3)}$ "Timeliness and Professionalism of the facility manager is a significant predictor of office building performance"

$H_{042\ (4)}$ "The facility managers' response plan to public and building service emergencies is a significant predictor of office building performance"

$H_{042\ (5)}$ "The facility managers' response plan to poor regulatory policies and standards enforcements is a significant predictor of office building performance"

By extension the two alternative sub-hypotheses from which these five sub-hypotheses were derived are also true. Hence, $H_{04(1)}$ The quality of FM service in office buildings is a significant predictor of their performance

$H_{04\ (2)}$ Crises response and management ability of FM service in office buildings is a significant predictor of their performance

### 4.8.3 The Equation of the Model

Having established that the independent variables are significant predictors of the dependent variable, there is the need to go ahead and state the regression formula for the model. Table 4.26 displays the value of the constant ($\beta_0$) and the regression coefficients ($\beta_0$ to $\beta_n$) for each of the independent variables and hence their individual contributions to the dependent variable (building performance). In multiple regressions, the model takes the form of an equation. Using the regression equation from the conceptual theory as follows:

$BPV = b_0 + b_1F + b_2QS + b_3CRM + e$; and substituting the unknowns with the *B* values obtained from the regression analysis (Table 4.26), the regression equation for the predictive model that is developed for building performance value (with the *B* values approximated to two decimal places) is hereby stated as:

***BPV = 3.6 + 0.37SCAFE + 0.31GQP + 0.23TP + 0.12PSBE + 0.14PRSE***

The interpretation of this equation is that BPV (Building performance value) can be derived by multiplying the coefficient of determination of each variable by their values in each case (as scored by the building users), subsequently summing up the resulting values and adding the coefficient of determination of the constant (3.6).

### 4.8.4 Contribution of Each Independent Variable to the Model

The interpretation of this model is that the effectiveness of FM service variables of Safe, clean, attractive and Functional work environment (SCAFE), good quality end product (GQP) and timeliness and professionalism (TP) are responsible for 37%, 31% and 23% of the variations in building performance, respectively. While the crises response and management variables of response plan to public service (PSBE) and building emergencies and response plan to poor regulatory policies and poor standards enforcement (PRSE) are individually responsible for 12% and 14% of the variations in building performance value respectively. Putting it differently, it means a unit change in the safe, clean and attractive variable will be responsible for 0.37 unit change in building performance and so on. These effects are medium and large scale effects.

Table 4.26 also shows the standardized beta values for each of the independent variables. This is the unique contribution of each independent variable to the dependent variable where all other independent variables are held constant. According to the standardised beta values the contribution of the factors to building performance arranged in a descending order are as follows:

- SCAFE has the greatest contribution with 0.43 standard deviation unit contribution i.e. 43%
- GQP with 0.33, standard deviation unit contribution i.e. 33%
- TP with 0.268, standard deviation unit contribution i.e. 26.8%
- PRPSE with 0.164 standard deviation unit contribution i.e. 16.4% and
- PSBE (0.134) standard deviation unit contribution i.e. 13.4%

These individual contributions are middle to large effects and they follow the same trends as the t statistics and goes to further confirm the significance of these contributions as earlier established.

### 4.8.5 Generalizing the Model to the Population through Validation

There are two steps that are required in order to be able to generalize the findings of the model in a sample such as the one in this study to the population i.e. make inferences beyond the sample from which the data were collected. These are by cross validation and by ensuring that the usual assumptions of a model are met (Field, 2009).

***Cross Validating the Model***

This is the process through which one ensures that a model measures what it is required to measure. Cross validation can be done in two ways i.e. by using the adjusted coefficient of determination (adjusted $R^2$) value or through use of split data analysis whereby the data in the study is randomly split into two to observe if the coefficients of determination of the split data vary significantly. The adjusted $R^2$ indicates the extent to which a model can be generalized to the population and should ideally be close to the $R^2$ say about a difference of about 5%. The adjusted $R^2$ in this study is .613 compared to the $R^2$ value of .629. This difference is about

2.5% which indicates good cross validation of this model. The results of the data splitting are shown in Table 4.27. This shows that the coefficient of determination values obtained from the two split samples and the full data set sample are quite similar. The coefficient of determination ($R^2$) is 0.63 for the full data set and exactly the same value for the first split data set. The second split has a similar but even higher coefficient of determination value of 0.68. That is to say, that while the coefficient of determination, $R^2$ of one of the split model is exactly the same value as that of the full data set while that of the second split is within 8% of the $R^2$ for the full sample model.

**Table 4.27: Model Validation Results (Split Analysis)**

| | **Full Data Set** | **Split = 0 (Split 1 = 1)** | **Split = 1 (Split2 = 2)** |
|---|---|---|---|
| **ANOVA significance (sig <= 0.05)** | <0.001 | <0.001 | <0.001 |
| **$R^2$** | 0.63 | 0.63 | 0.68 |
| **Significant Coefficients (sig<=0.05)** | Safe, clean, attractive and functional work environment (SCAFE)<br><br>Good quality end product (GQP)<br><br>Timeliness and Professionalism (TP)<br><br>Response plan to poor regulatory policies and poor standards enforcement (PRPSE)<br><br>Response plan to public service and building emergencies (PSBE) | Safe, clean, attractive and functional work environment (SCAFE)<br><br>Good quality end product (GQP)<br><br>Response plan to public service and building emergencies (PSBE)<br><br>Response plan to poor regulatory policies and poor standards enforcement (PRPSE) | Safe, clean, attractive and functional work environment (SCAFE)<br><br>Good quality end product (GQP)<br><br>Timeliness and Professionalism (TP)<br><br>Response plan to public service and building emergencies (PSBE) |

The F ratio of the relationship (coefficient of determination value) between the dependent variable and the set of independent variables were also found to be statistically significant for each of the split samples at 99% i.e. ANOVA significant (sig. < 0.001) Hence, the validation analysis supports the findings of the analysis on the full data set and the model stands validated. The implication of this is that if data from other samples from the population are analysed it is likely that similar parameters to the one in this sample will be obtained.

***Assumptions Met by the Model***

There are a number of assumptions that a model must meet before it could become applicable beyond the sample. Table 4.28 gives a summary of the assumption tests that were done, the method adopted in the tests and the findings.

**Table 4.28: Assumptions of Non-bias met by the Model Developed in the Study**

| Assumption | Type of Test | Findings | Decision |
|---|---|---|---|
| Autocorrelation | Durbin Watson (DW) value | DW value of 2.1 obtained. 2 is perfect, any value >1 or < 3 is acceptable | Assumption met |
| Heteroscedasticity, | Scatter plot of standardised residual against predicted value | No funnel shape in the array of dots in plot. Homescedasticity indicated | Assumption met |
| Linearity of relationship | Scatter plot of standardised residual against predicted value | No curve observed in the array of dots in plot. Linearity indicated | Assumption met |
| Multicollinearity | Correlation matrix between variables | Highest correlation of 0.518 is much less than the 0 .9 boundary for presence of multicollinearity | Assumption met |
| Normally distributed error | Histogram of regression standardised residual | The curve of the errors in the histogram shows normal distribution | Assumption met |
| Normality of distribution | Normal probability plot of standardised residual | The residual trails the regression line closely and does not deviate strongly from it, | Assumption met |
| Undue influence of cases | Scatter plot of standardised residual against predicted value and Cooks distance | No outliers observed in array of dots in plot. Cooks distance was a mean of 0.015 and a maximum of 0.567, i.e. less than 1 value for concern | Assumption met |

The first assumption that is required according to Field (2004) and Field (2009) is that the data for all predictor variables must be either categorical or quantitative and the outcome must be quantitative and unbounded. Both the predictors and outcome data in this study are quantitative, while the outcome is quantitative and unbounded as required. Hence, this assumption was met by the model. The second assumption is that of absence of multicollinearity. There should be no perfect linear correlation between any two or more predictors as it makes it difficult to observe the individual effects of the variables. Multicollinearity is indicated by high correlation coefficient higher than 0.9. The correlation matrix of the independent variables is presented in Table 4.29. It confirms the absence of multicollinearity as the highest level of correlation between the variables is 0.518 which is nothing close to 0.9.

**Table 4.29: Correlation Matrix of the Independent Variables**

| | SCAFE | GQP | TP | PSBE | PRPSE |
|---|---|---|---|---|---|
| **SCAFE** | 1.000 | | | | |
| **GQP** | -0.039 | 1.000 | | | |
| **TP** | 0.016 | 0.057 | 1.000 | | |
| **PSBE** | 0.504 | 0.209 | 0.342 | 1.000 | |
| **PRPSE** | 0.178 | 0.518 | 0.301 | 0.061 | 1.000 |

Another required assumption is the absence of autocorrelation otherwise known as independent errors. For any two observations, the residual terms should not be correlated. Residuals are the difference between the observed data in the study and the values the model predicts. Serial autocorrelation between residuals (errors) can be tested using Durbin Watson

value. This value varies between 0 and 4 with a value of 2 meaning that the residuals are uncorrelated, so the closer the Durbin Watson value is to 2 the better. As a rule of thumb Durbin Watson values less than 1 or greater than 3 is cause for concern (Field, 2009). The Durbin Watson value in this study is quite close to 2 at 2.11. Therefore there is absence of autocorrelation in this model meaning that the model also meets the absence of autocorrelation assumption.

Some other assumptions are Homoscedasticity, cases of undue influence and linearity of the relationship which can be observed from the plot of standardised (Z) residual against standardized (Z) predicted. (Z resid against Z pred). This is the plot of the standardised difference between the predicted data and the residuals (which is observed data minus predicted data). Figure 4.6 depicts the scatter plot of the Z resid against Z pred for the model in this study.

Homoscedasticity is the assumption that variables in each predictor have similar variance, while linearity assumes that the relationship being modelled in the study is linear. Homoscedasticity can be observed from the scatter plot of the Z resid against Z pred. Any funnel in the shape of the array of dots is an indication of heteroscedaticity, while a curve in the shape is an indication of absence of linearity of relationship. Also, the presence of any outlier can also be observed from this scatter plot.

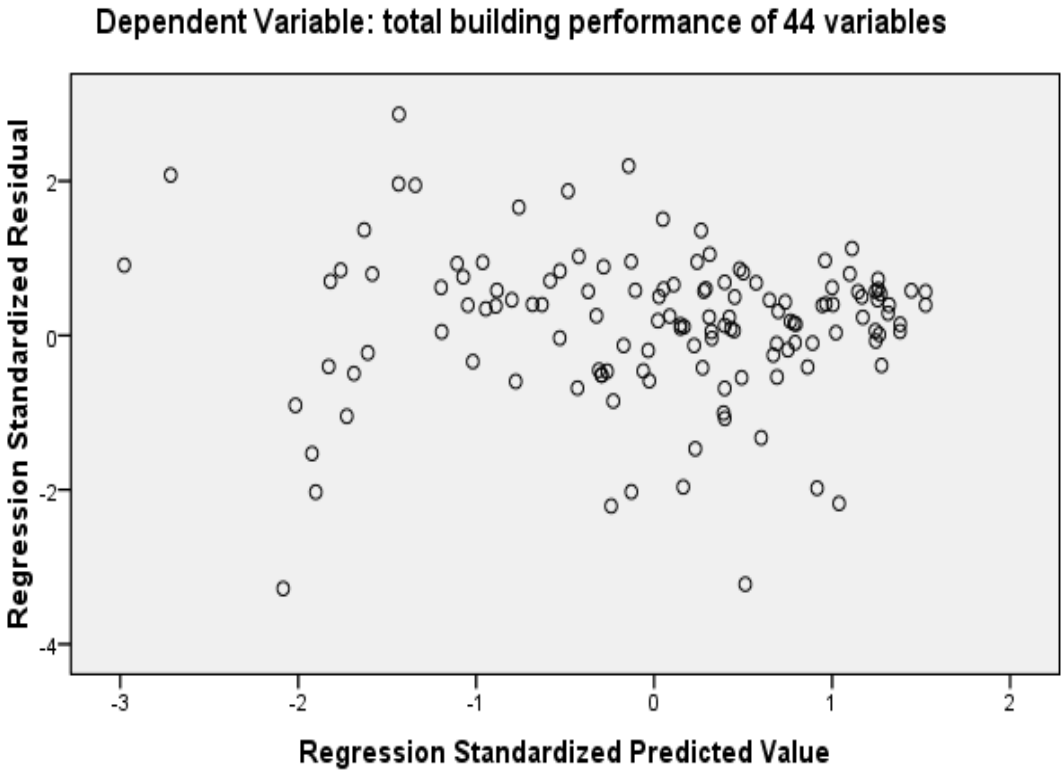



***Figure 4.6: Scatter Plot of Regression Standardised Residuals against Predicted Value***

It can be observed that the dots in Figure 4.6 are random array of dots. The dots do not present any obvious curve or funnel and there are no obvious outliers or any undue influence hence confirming that this model meets the assumption of linearity of relationship, homoscedasticity and absence of cases with undue influence. A case with undue influence can also be detected using the cook distance of the variables. For a model to meet this assumption the Cooks distance of the variables should be less than 1. For this model the highest cooks distance is 0.567 while the mean cooks distance is 0.015. Both values are much less than the value of 1 for concern, thereby confirming the absence of variables with undue influence in the data.

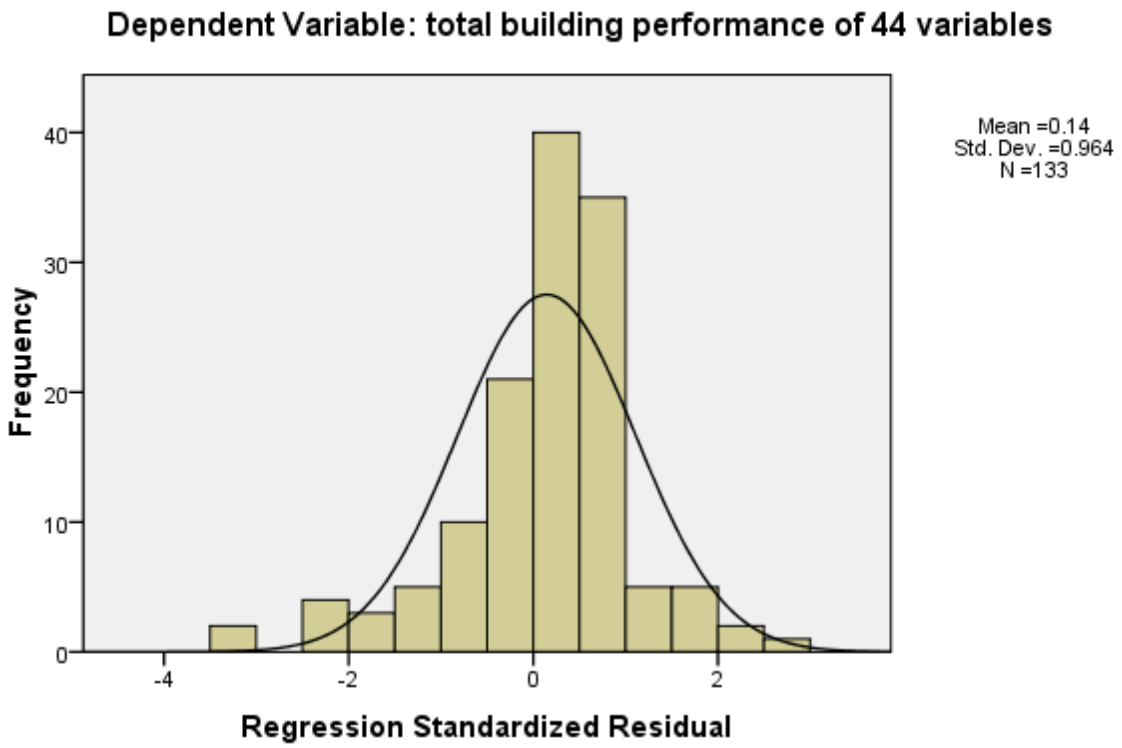



***Figure 4.7: Histogram of Regression Standardised Residuals***

Another assumption, that of normally distributed error can be observed from the histogram of regression standardised residuals. The terms of this assumption is that the residuals in a model are normally distributed and not much greater than zero. The curve of the histogram of the residual in Figure 4.7 shows that the errors in this model are normally distributed and it is not skewed to either side. This indicates that this model also meets this assumption.

The normality of the distribution of data and hence how unbiased the model is can also be observed from the Normal probability plot of standardised residual. This plot will indicate how close the curve of the residuals compares with the regression line. The closer the two

lines are the more normal and unbiased the model distribution is. Hence a model whose residuals deviate significantly from the regression line has a distribution that is not normal.

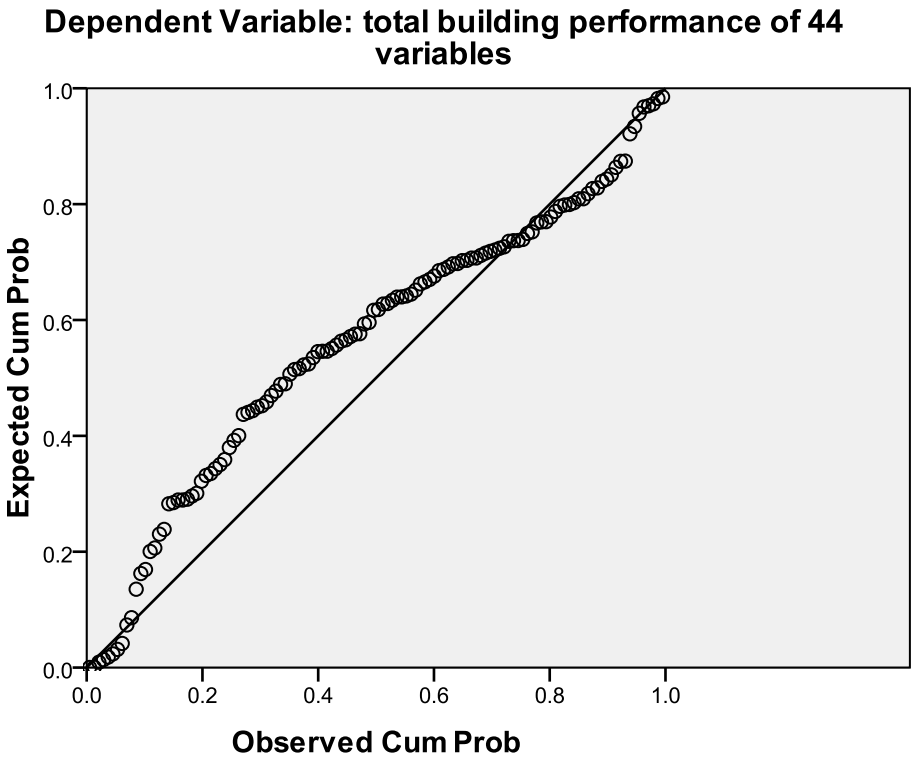



***Figure 4.8: Normal Probability Plot of Regression standardized residual***

Figure 4.8 depicts the Normal probability plot of regression standardized residual for the model in this study. The dots are the residuals for the individual cases, while the straight line is the regression line. This result indicates that the residual trails the regression line closely and does not deviate strongly from it, hence further supporting the normality of the distribution in the data in this model and its unbiased nature. These different analyses indicate that the model built in this study meets all the test of assumptions that are required to make it possible to generalise its parameters beyond the study sample. This implies that the regression coefficient and parameters of this model are unbiased and the likelihood of these parameters being same as that of the population is increased (Field, 2009).

# CHAPTER FIVE

# DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

## 5.1 DISCUSSION OF FINDINGS

This section discusses the findings that were presented in the previous chapter, vis-a-vis the various objectives.

### 5.1.1 Important Measures of Effectiveness of Facilities Management Services

Respondents in this study were required to rate 42 variables made up of eight (8) financial, 22 quality of service and 12 crises response and management variables, in terms of how important they are as measures of effectiveness of FM service. Forty one out of this number were rated as important measures by the respondents. The only measure that was rated unimportant is "Number of prospective tenants who show interests in renting space per month" This indication that 41 out of the 42 featured measures were rated as important by the respondent is not totally unexpected, as some less important measures were identified at the pilot study stage and removed from the total of 54 variables that were earlier presented. Hence, a multi-item scale of 41 measures for evaluating the effectiveness of FM was developed in this study.

A number of authors have attempted to develop similar multi-item scale for measurement of effectiveness and or quality of FM such as Varcoe (1996), Parasuraman *et al.* (1988), Hinks and McNay (1999), Ho *et al.* (2000), Hoxley (2000) and Shaw and Haynes (2004). There are sufficient similarities between the measures indicated in these past works and those

indicated in two ("financial" and "quality of service) of the three categories of variables in the current study, although sometimes the nomenclature are different. For example, 13 of the measures featured in Hinks and McNay (1999) are among the measures in the "quality of service category" in the developed scale. These measures include provision of safe environment, achievement of completion deadlines, energy performance and management of communication. Similarly, five (5) from Amaratunga et al. (2000) including timeliness of service, effectiveness of communication and good quality service can also be found among measures in this same category in the developed scale. Lavy et al (2010) identified about nine (9) measures that were similar to those in the "quality of service category" of this new scale, such as indoor environment quality, health and safety, security, adequacy of space, parking and customer satisfaction with facility. Similarities were also observed between measures in the "quality of service" category in this study and eight (8) measures in Leaman and Bordass (2001), some of which are effective complaint desk, quickness of response, level of absenteeism, good feedback procedure and proactive help desk.

Some of the financial measures in the scale developed in this work that were featured in the works of Varcoe (1996) and Amaratunga *et al.* (2000) are working capital and total costs respectively. Other past works with similar financial measures are Lindholm and Levainen (2006) and Lavy *et al*. (2010) featuring occupancy cost per metre square and total operating costs and Lindholm and Nenonen (2006) which featured operative cost of individual items, occupancy cost, return on assets and vacancy rate.

In spite of the obvious similarities between measures in these two categories in the current study and past works, it is indicated that no similarities exist between measures in the third

category, ("crises response and management") and those in past works. This suggest that measures in this category may be more relevant to the peculiar Nigerian socio-economic contexts where standardisation and regulatory policies are in-effective and infrastructural provisions are poor.

For example, the state of infrastructural provisions such as water and power are very poor in Nigeria. As a consequence, there are frequent cuts in public water and power supply, often resulting in service disruption. Dangerous power surges, often resulting in breakdown of equipment are also prevalent. Furthermore, most construction materials and service equipment that are used in Nigeria are from imported sources. Unfortunately, because there are no adequate standardisations, majority of these imports are either adulterated or sub–standard. These result in premature break-down of equipment, frequent disruption of services and other dangerous consequences such as building collapse and fires. Another dimension is that of the poor skills of artisans and contractors in the country's construction industry. Most artisans are trained by older colleagues informally without any formal certification. Without any attempt at regulating and standardising these trainings programmes by government through appropriate authorities, artisans with very variable skills, often times poor, became prevalent in the industry, invariably resulting in poor quality construction and services. These often result in equipment breakdowns, disruption of services and other emergencies earlier mentioned. In view of these, measures of effectiveness of FM in the Nigerian context must include how well a facility manager can respond to these situations and the resultant emergency issues. This agrees with the conclusion in Lavy *et al*. (2010), that current trend at local, regional and global levels represents demand and invariably impact on measures of performance in FM. This justifies

the need to develop a scale of appropriate measures in this study and to use this in evaluating effectiveness of FM in the subsequent sections of the research. This is consistent with Ho *et al*'s (2000) argument that the development of appropriate performance measurement metrics is the first step in the facilities performance measurement process of benchmarking. The scale developed in this study uncovered insights into this unexplored category of measures (crises response and management) which provided for the earlier discussed and peculiar Nigerian socio-cultural context, hence making it more relevant.

Variables that measure prevention and response plan to fire, accidents and other emergencies including health emergencies were rated as the first two most important variables overall. This emphasizes the importance of health emergencies, accidents and fire prevention and management ability of the facilities manager to the building users. This is not surprising with the spate of health emergencies (people collapsing at work and dying at their desks), building collapse, incessant fire and other accidents. Others are the more recent suicide bombing incidents in Nigeria and the poor handling of these emergencies with the antecedent loss of live and resources. Issues of health and safety were similarly rated among the top ten important measures in past researches such as Hinks and McNay (1999) and Meng and Minogue (2011) but only as it relates to meeting legislative requirements on these issues and not response to the frequently recurring crises from them as in the Nigerian situation.

The ranking of occupancy cost as 3$^{rd}$ most important measure of the effectiveness of FM by the respondents (BSS providers) is an indication that a building's running cost is important to building operators as it is as important to the owners. This was similar to the findings in

Ho et al. (2000) where total cost, maintenance expenditure and operation costs were rated 1st to 3rd most important amongst 97 variables.

"Use of quality materials in providing service" was rated 4th most important measure, overall. This is in the realisation that poor product standardisation and regulation has resulted in the prominence of sub-standard and adulterated products within the Nigerian construction industry. Some other measures in the "crises response and management category" such as power failure emergencies and shortage of water supply were also rated, highly, having mean importance ratings of 4.49 and 4.43 and ranking 5th and 10th overall respectively. It is important to recognise that these factors, unlike in previous researches where they may be important only as they relate to disaster recovery in the event of natural disasters are in Nigeria, day to day aspects of operation of facilities. This accounts for the level of importance that the respondents placed on them and justifies their inclusion as a new category of measures in this study, in order to bring to light those important dimensions that may be more relevant to the Nigerian facility manager's job scope.

Issues of professionalism of FM staff were ranked lowly overall, in terms of their relative importance. Hence measures such as "friendly and courteous premises staff", "high level competence and professional approach of premises staff", "Effective and proactive complaint/help desk service" and "Level of absenteeism of FM/premises staffs were rated 31st, 34th, 36th and 41st (last) overall, respectively This is inconsistent with the findings in Hinks and McNay (1999) where they were perceived to be relatively more important and in Leaman and Bordass (2001) and Hui and Zheng (2010) where the importance of these staff related attributes in effective FM were well recognised. Similarly, commitment of staff,

their response time, service reliability and client-service provider relationship, were among the top ten rated measures in Meng and Minogue (2011). This findings suggests that expectation of consumers in the Nigerian context are reasonably lower than that of the developed world where most of these earlier works emanated. This further supports the notion that the need of users and performance standards varies with trend and socio-cultural contexts (Chotipanich, 2004 and Lavy et al., 2010).

The three (3) most highly rated financial variables i.e. "occupancy cost per annum per square metre" "Total operating cost per annum per square metre" and "Rent earned by building per square metre" seems relatively easier to calculate being one lump sums that can be easily translated into a unit measurement of cost (Per square metre in each case). This suggests that Nigerians prefer the more straight forward and lump sum type of financial indicators which require minimal knowledge of mathematics and computer analysis. It was also found that the investment quality related measures of office buildings are less popular with the BSS providers. For example, the two (2) least important variables i.e. "number of prospective tenants who show interests in renting space per month" and "Average annual percentage of vacancy in property" are more quality related financial measures. They are also important measures for investment properties. This implies that respondents (FM operators) in this study puts less emphasis on the performance of office buildings as investment properties and are more particular about cost of occupation. This is consistent with findings in Ho *et al.* (2000) where measures of costs of occupation were most highly rated.

## 5.2 Level of Performance of Office Buildings in Lagos Metropolis

The financial perspective attempted to establish average financial costs as provided by the respondents for various cost types as were identified earlier in this study. The non-financial perspective examined the performance of office buildings in terms of the comfort that they provide to users and how satisfied the users are with their work environment.

### 5.21 Financial Performance of the Buildings

The financial data that were made available by the respondents was significantly limited by attitude of poor financial disclosure. However this study was able to determine average performance for three different units of measurement as follows:

1) Average operating costs of office buildings in Lagos metropolis was found to be N6860.59 (six thousand eight hundred and sixty naira fifty nine kobo / m2 /annum
2) Average occupancy cost of office buildings in Lagos metropolis was found to be N27,906.36 (twenty seven thousand nine hundred and six naira thirty six kobo, while/ m2 /annum
3) Average maintenance cost of office buildings in Lagos metropolis was found to be N3,553.34 (three thousand five hundred and fifty three naira thirty four kobo) / m2 /annum

These values provide first strike benchmarks against which a building's financial performance in terms of the above units of measurements can be determined. A building that indicates a value that is significantly higher than these observed averages could imply that there is a need for improvement in the building's cost control mechanism. It could also signify that the unit cost of space in the building is too high. Another indication could be that the provision in the building or the required service quality is more than those of average

buildings. However, it is important to recognize that cost benchmark must be used with utmost care. Each building has its specific circumstances and cost centres which determine unit cost (Williams 2003). These specifics include:

- Scope and nature of the service and performance levels required by client (i.e. level of cleanliness, security etc.)
- Quality and quantity of equipment and provision required by client or provided by management
- The level of sophistication of equipment provided within the building
- Energy efficiency level of the building
- Physical features of the building including size, level of fenestration, number of floors, number of users, ease of access to support service points.

These factors are some of the numerous determinants of average cost of building service provision and unless an average benchmark cost is adjusted for these specific cost centres it remains a first strike point of reference and may not be very useful in direct comparison. This depth of analysis of the cost data is however beyond the scope of this study and could serve as an area of further studies leading to the development of national and probably international benchmarking models as the *Estatesmaster* developed by Bernard Williams Associates in the UK.

### 5.2.2 Performance of the Non-Financial attributes of Office Buildings

It was found that only three (3) of the variables used in this study are rated “satisfactory”. This implies that office buildings in this study are performing “satisfactorily” only in three (3) of the 27 measures of satisfaction and are performing “somewhat satisfactorily” in all

other 24 indices. This indicates a strong need for improvement in most of the areas of performance of Nigerian offices.

***Satisfaction with work environment category***

Amongst variables in this category internal environment satisfaction variables were most highly rated. Such variables include "Safety of placement of electric socket and switches" (rated 1$^{st}$), followed by "Overall suitability of building to organizational need" (rated 2$^{nd}$) and "Level of office hygiene" rated 3$^{rd}$. Further indications are that Efficiency and comfort of office circulation space/layout" came 4$^{th}$, while "Security of doors and gates" came 5$^{th}$. While these findings are consistent with those from some previous studies they are at variance with others. For instance, in the works of Lee and Guerin (2009) "cleanliness" was rated quite highly, while in an inconsistent manner buildings in Leaman and Bordass (2001) underperformed in the aspect of space planning and office layout and circulation, while security also underperformed in Bottom *et al.* (1998).

The building attributes in which Nigerian office buildings are performing least in the "satisfaction with work environment" category is in the area of health and safety. Three variables in this area i.e. "Quality of escalators and adequacy of its safety provisions", "Adequacy of building safety, fire protection and other emergency provisions" and "Efficiency and adequacy of health and first aid provisions" were ranked 27$^{th}$ (last), 26$^{th}$ and 25$^{th}$ respectively. The need to improve on these least performing aspects cannot be over-emphasised in view of the spate of fires, accidents, building collapse health and other emergencies in the country and the accompanying unnecessary loss of lives.

The Lagos State government disclosed that in the state alone there have been 4,035 fires and 31 building collapse incidents between years 2007 and 2011 (Ugbodaga, 2011). Some notable disasters among buildings in the state include the fire incidents at The Independence House also known as the Ministry of Defence Building Lagos, National Food and Drugs Administration and Control Office, and Federal Secretariat Ikoyi. There was also the recent fire and partial collapse of the 21 storey Nigerian Industrial and Development Bank building in Lagos and the fire incident in UBA Plaza, Breadfruit Street, Lagos.

Lufeju (2005) explained that most of these buildings got engulfed in fire because neither the equipment nor the operators were in a ready state to combat the fire incidents when they occurred. It is more disheartening to note that despite the frequencies of similar emergencies all over the country only 22 of the 36 states of the federation have emergency management agencies backed by law. Worst still, only 21 of the 774 local government areas in Nigeria have implemented disaster vulnerability and capacity analysis (Fagbemi, 2011). Therefore stakeholders such as facilities managers and building owners must ensure that the government put in place necessary policies and procedures on health emergencies, accident, fire prevention and management in order to enhance safety and protect the lives and properties of building users.

Health and safety issues were not so much of a concern in most of the previous studies. This is probably because unlike in the Nigerian environment, enforceable legislations exist to ensure strict compliance with building health and safety issues within the contexts in which these researches applied. Prominent among the low performing building attributes as identified in previous researches are thermal comfort and acoustic quality particularly

relating to noise. These two attributes were of concern in the works of Bottom *et al.* (1998), Leaman and Bordass (2001) and Lee and Guerin (2009).

In the current study, "adequacy of signage and direction displays performed relatively poorly at 23rd position. This is not a good indication, as signage is a very important tool in FM in the developed world. With the use of proper signage users of facilities travel several kilometers without spending precious time asking for directions. For example, by using the provided signage, passengers could move conveniently through transit points at airport terminals. In most cases such transfers entails a complicated process involving movements between several kilometres and transportation means as trains, trams etc., but usually made easy with the availability of prominent signage all over. In contrast, physical observation of some of the office buildings in the study sample shows that because the signage is usually poor, you may not be able to find the toilet on a floor, or locate an office without asking for directions and losing precious time. Provision of adequate and accurate signage is a task that has to be taken up seriously by Nigerian office building support service providers to improve this aspect of building performance.

It was indicated that variables such as "Efficiency of the location of private offices in relation to other offices within the department" "Adequacy of overall building security provision" and "Adequacy and convenience of location of office equipment" indicated comparatively middle level performance at 13th, to 15th positions respectively out of 27. This research also indicated that Nigerian workrooms are relatively inefficient with "Efficiency of workrooms" coming 24th out of 27th "Issues of internal quality of the office including

equipment and furniture are also performing poorly as they came up in the lower half but they are not performing as poorly as the health and accident emergencies.

***Performance of the Comfort Variables***

Issues of internal ambient condition and configuration were the most highly rated comfort variables. For example, "convenience of placement of electric socket and switches", is the best rated variable. The level of satisfaction of the respondents with this building attribute is further indicated in the realisation that a counterpart variable in the "satisfaction with work environment" category i.e. "adequacy of electric sockets" was also rated as the best performing variable. Interview with users within this study indicate that this was because the wide use of adaptors and extension cords in offices in the country has created flexibility and that this has made the specific position of the sockets on the walls less important, as users can just extend an extension cord to whichever position it is needed in the office. Therefore, the high rating of this measure is not a reflection of the convenience or adequacy of the placement of the sockets within the building but a reflection of the fact that optional provisions by way of extension cords have made the specific placement position of sockets more adaptable. It is important to understand that the use of this flexibility cords portends imminent danger, as the resulting improper power ratings and connections often result in fires. It is relevant to recall that in the work of Bottom *et al.* (1998) buildings performed poorly with respect to "flexibility of power and Information technology connection points" This is probably because there are greater restrictions on arbitrary use of adaptors and connection wires, for safety reasons in the context of this earlier work.

Still on the comfort group of variables, “Adequacy and freshness of natural ventilation” was rated 2nd, Quality of natural lighting 3rd while “Flexibility of position of furniture, fittings and equipment was rated 4th. This implies that offices within this sample are doing relatively well in terms of the natural ambient condition and flexibility of internal layout. This is at variance with findings in previous researches where these areas of building performance were of major concern. For example in Bottom *et al.* (1998) buildings performed poorly in terms of “Flexibility of floor space” “control of mechanical ventilation” and “artificial and natural lighting”. Also, “flexibility of controls of ambient conditions”, “natural lighting”, “acoustic quality” and “thermal comfort” were rated poorly in Leaman and Bordass (2001) and Lee and Guerin (2009). Similarly, thermal comfort, ventilation and acoustic quality were rated poorly in Sawyer, de-Wilde and Brooks (2008). This difference in ratings of these measures of comfort of internal ambient conditions between building occupants in this study and those of previous works is probably an indication of the lower expectations and need of users in the Nigerian contexts. This further supports the assertion that need of users varies with trend and contexts (Lavy et al, 2010).

The least performing aspects of office building comfort are “Comfort of lifts, elevators and escalators” (18th), “Quality of humidity control provision” (17th, last) and “Comfort and efficiency of sun glare prevention mechanism (16th). These findings are similar to those in Bottom et al. (1998) where adequacy of lift and prevention of solar glare were rated poorly. This study also indicated that Nigerian office eating facilities are not performing well relatively to other variables at 15th position.

With respect to performance of building attributes, it is recognised that the findings in this study show minor similarities with those of past researches. However, there are sufficiently marked differences between them, thereby re-affirming the notion that performance of building attributes, just as with user needs, varies with contexts. Therefore researches on building performance must be tailored to a particular context for the findings to be informative and useful as a guide in strategic decisions making.

The overall satisfaction performance of the buildings in this study is 3.72 on a scale of 5, while that of comfort is 3.60. The average performance for the two categories of measures is 3.67. These values are within the "somewhat satisfactory" range and imply that average Nigerian office buildings are only performing somewhat satisfactorily. Therefore, substantial effort is required by both building owners and operators towards improvements, to enable these buildings perform satisfactorily. These values provide useful industrial benchmarks against which an average building could benchmark the quality of its services. Such benchmark could measure aspects of performance of "satisfaction with work environment" "comfort" as well as overall performance of a building. A building with a mean performance rating that is not significantly different from the benchmark implies satisfactory performance in comparison with the average. One that is significantly higher or lower than the benchmark signifies a comparatively good or inadequate performance respectively. BSS providers could also choose to compare their buildings' ratings for individual measures to know how that particular attribute is performing compared to market indicators, so as to know how to address user's agitations. For instance if a building rates 4.0 for "Flexibility of position of furniture, fittings and equipment and the benchmark is 3.85, whereas the building users have this as one of numerous complaints, the BSS provider could chose not to make this a priority

in the face of limited resources as it is considered that the building is at least outperforming the industrial benchmark in this area.

### 5.2.3. *Hypothesis 1: Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory*

The null hypothesis that "Performance of office buildings in Lagos Metropolis is not significantly less than satisfactory" was rejected. This implies that from the user's perspective the performance of office buildings in the study are less than satisfactory and that conscious and concise effort are required on the part of all BSS providers to make the quality of their services satisfactory. Also a BSS provider that wants to be different or wants to add significant value to the business of his client must aim at satisfactory performance level. This will also help create a positive reputation for him.

## 5.3 Comparison of Performance between Strategic and non-strategic FM Managed Office Buildings

The mean values of performance of the strategic FM managed buildings were compared with that of the non-strategic FM managed buildings. For the measures in the satisfaction with work environment group, it was found that the buildings where strategic FM principles were applied performed consistently better than buildings where non-strategic FM principles were applied. These difference in some of the variables such as "quality of office equipment" and efficiency and adequacy of first aid provisions are as high as 1.03 and 1.57 unit respectively. The comfort variables show similar disparity as all the mean performance values for the variables in the strategic FM managed buildings are higher in each case than in the other group of buildings. The cumulative mean performance of the "satisfaction with work

environment" variables for buildings managed through strategic FM is 0.83 unit (out of a maximum score of 5) more than their non-strategic FM managed counterparts. While the cumulative mean performance of the comfort variables for the strategic FM managed buildings is 0.81 unit (out of a maximum score of 5) more than that of the non-FM managed buildings. This result supports the established positive effect of strategic FM on building performance according to literature. It also indicates that there is sufficient difference in the performance between strategic FM and the non-strategic FM managed buildings. An hypothesis was postulated to determine if these observed difference in mean values are statistically significant.

### 5.3.1 *Hypothesis 2: No significant difference between performance of office buildings which adopt strategic facilities management principles and those that does not*

The null hypothesis that "There is no significant difference between the performance of office buildings which adopt strategic FM principles and office buildings that do not" was rejected. This indicates that the application of FM principles in the management of office buildings translates to improved performance in the population. Therefore, this study supports the notion by authors such as Amaratunga *et al.* (2000); Hinks (2000); Alexander (2003); Olomolaiye *et al*. (2004); Fielder (2004); Kwok and Warren (2005); Lindolm and Levainen (2006); Pickard (2006) and Noor and Pitt (2009) that FM improves efficiency of the management of space and other assets for people and process and invariably enhances organizational productivity.

## 5.4 Level of Effectiveness of FM and its Relationship with Performance of Office Buildings

### 5.4.1 Effectiveness of the Services of BSS Providers

This section analyses the data that were provided by the respondents on the level of effectiveness of the BSS providers before proceeding to determine the relationship between this and building performance. The attitude of poor financial disclosure exhibited by the respondents made it impossible to obtain information in this category. Hence the performance assessment of the buildings was limited to the soft non-financial measures.

***Non-Financial Effectiveness of BSS Providers in the Study***

"Suitability of premises and work environment to work" "Friendliness and politeness of premises/FM staff" Use of quality materials in providing service", "Provision of satisfactory standard of office cleaning" and "response plan to failure in public mains water and portable water supply" were rated 1$^{st}$, 2$^{nd}$, 3$^{rd}$ and 4$^{th}$ respectively. "Completion of project to customer satisfaction" and "provision of satisfactory standard of cleaning" were also rated in the 4$^{th}$ position. This result indicates that BSS providers in this study are most effective in aspects of functionality of service and high level of professionalism as they are perceived to be friendly, reliable, and capable of providing satisfactory work environment for their users. They are also able to complete job to their user's satisfaction.

The low ends of the effectiveness of the services of the BSS providers includes high level of absenteeism among BSS providers (ranked 31$^{st}$) out of all 31 variables, followed by managing unexpected breakdown of fixtures and fittings (30$^{th}$), response plan to scarcity of materials and supplies (29$^{th}$) and high level of energy performance (28$^{th}$). Other poor

performing aspects of FM provisions are "Provision of good feedback and service quality review (27th), managing effects of corruption and lack of transparency on quality of service (26th) and response plan to equipment breakdown (25th). This implies that there is high level of absenteeism among FM service providers and their response plan to emergency breakdown and material scarcity is poor. Office users are of the opinion that BSS providers are not doing enough to provide them with effective low energy consuming power sources, quality equipment and maintenance provisions and that their quality review process is poor. These dimensions are very important focus areas for BSS providers whose intention is to add value to their client organization, therefore, Nigerian BSS providers must improve in these areas. Besides, the issue of energy performance has become a controversial issue worldwide because of its cost saving and environmental protection and sustainability dimensions.

Only two of the variables that were ranked in the top ten positions belonged to the crises response and management category. This implies that the BSS providers are performing much less satisfactorily in this category of the service. Hence much effort is required in these aspects to improve the effectiveness of their services, if FM is to have more significant effects in Nigeria. The BSS providers were rated "somewhat satisfactorily" in only six variables and less than this in all others. Also, the overall average performance value for all variables falls within the "non-satisfactory" category indicating that BSS providers in the study need to enhance their performance in several areas in order to improve the level of satisfaction that users derive from their services.

### 5.4.2 Relationship between Effectiveness of FM and Building Performance

The following five factors were identified as the key dimensions of effectiveness of FM from the factor analysis that was carried out:

Factor 1 (Safe, Clean, Attractive and Functional work Environment- SCAFE)

Factor 2 (Good quality end product – GQP) and

Factor 3 (Timeliness and Professionalism- TP)

Factor 4 (Response plan to public and building service emergencies - PBSE) and

Factor 5 (Response plan to Poor regulatory policies and standards enforcements – PRSE)

These dimensions are consistent with indications from a number of previous studies and although these authors' dimensions could be in a different name the underlying factors are similar. Examples of such studies and the indicated dimensions and similarities to the current study are stated as follows:

- Amaratunga (2000) – Timeliness and good quality service; related to Timeliness and good quality end product.
- Ho *et al*. (2000) – Cleaning, safety and environment; related to Safe, clean, attractive and functional environment.
- Brennan *et al.* (2002) – Physical environment and perceived performance of FM staff; related to attractive and functional environment and Professionalism
- Amaratunga and Baldry (2003) – competency of FM staff and process efficiency; related to Professionalism
- Moss *et al.* (2007) – Quality, reputation and morale; related to Good quality end product and Professionalism
- Tucker and Pitt (2009) – safety and cleaning; related to Safe, clean and attractive environment

Using these factors as the predictors in multiple correlation analysis with the dependent variable (building performance) a strong positive correlation with a correlation coefficient of 0.793 was obtained between the effectiveness of FM (independent) variables and building performance (dependent) variable, i.e. R = 0.793.

### 5.4.3 *Hypothesis 3: No Significant Relationship between Effectiveness of Facilities Management and Office Building Performance*

This hypothesis tests the statistical significance of the relationship discussed earlier. The null hypothesis that "There is no significant relationship between effectiveness of facility management and office building performance" was rejected implying that the relationship between effectiveness of FM and office building performance is real in the population. The two sub-hypothesis that were postulated for this objective with the aim of testing the strength between the individual independent variables and the dependent variables also indicates that in all cases the independent variables have statistically strong relationship with the dependent variable.

This finding indicates that a building's performance increases with increasing level of effectiveness of its FM and that every 1 unit improvement in the effectiveness of FM is accompanied with an almost .8 unit increase in building performance. This finding is consistent with Douglass' (1996) conclusion that building performance should be considered as a potential success factor for facilities managers. This result implies that executives of organizations can aim to improve the performance of their office buildings and hence worker's productivity by engaging the services of effective FM providers in the buildings.

Invariably, clients who require good performing office buildings must engage the services of effective facilities managers.

## 5.5 A Model for predicting Office Building Performance from Effectiveness of FM

A strong positive relationship was established between effectiveness of FM and building performance in objective four, but a correlation does not connote a causal effect. Therefore multiple regression analysis was used to determine if this relationship is a causal one, i.e. to determine if improved effectiveness in FM causes improved performance in office buildings. A causal relationship between the variables would enable the development of a mathematical model for predicting building performance value from the effectiveness of FM. This could serve as a bespoke tool for calibrating performance of office buildings that would be contextual to the Nigerian context.

The coefficient of determination value obtained indicates that the effectiveness of FM is a strong predictor of building performance value ($R^2$=0.629). This indicates that a large degree of variation in office building performance (approximately 63%) could be attributed to the independent variables (effectiveness of FM). A hypothesis (which is discussed in the next section) was thereafter postulated to determine if the independent variables are statistically significant predictors of the dependent variable using ANOVA test of the F ratio.

### 5.5.1 Hypothesis 4*: The effectiveness of facilities management is not a Significant predictor of performance of office buildings*

The null hypothesis that "The effectiveness of facilities management is not a significant predictor of performance of office buildings" was rejected. The two sub-hypotheses that

emanated from the main hypothesis were equally rejected, i.e. “The quality of FM service in office buildings is not a significant predictor of their performance” and “Crises response and management” ability of FM service in office buildings is not a significant predictor of their performance” This implies that the performance office buildings in Lagos metropolis can be predicted from both the Quality of the FM service and the Crises response and management ability of the FM service.

These findings are consistent with findings in previous studies such as that of Douglass (1996) that, FM is an organizational change that impinges on Facilities performance and that of Leaman and Bordass (2001) where a positive relationship was established between comfort of users and a quick service response system. In a consistent manner, Rogers (2003) explained that operational effectiveness translates to more robust, faster value added building service delivery, while Durodola, (2008) concludes that despite low commitment to FM principles hotels that apply them in Nigeria are more effective.

### 5.5.2 The Parameters of the Model

The regression equation that was formulated from the established statistically significant predictive relationship between the dependent and independent variables is stated as:

$$BPV = 3.602 + 0.372SCAFE + 0.309GQP + 0.231TP + 0.120PSBE + 0.144PRSE$$

This means that BPV (Building performance value) can be determined from the sum of the coefficient of determination of each of the five independent variables multiplied by their values in each case, plus the coefficient of determination of the constant (3.6).

The interpretation of this model is that where all the independent variables have a minimum score of zero, building performance value will be 3.6 i.e. the value of the constant. A possible maximum score of 5 for each of the variables will give a total building performance value of 9.5, out of which 3.6 is the value of the constant. This implies that 5.9 units out of the maximum building performance score of 9.5 can be predicted from the effectiveness of FM and is the true reflection of the FM input. This also implies that the value of building performance that would be obtained by using this model, could serve as a quantitative reflection of the contribution of the building's FM service to its performance.

### 5.5.3 Validation of the Model

A cross validation of the model was done using both the Split Sample Validation Method and the adjusted $R^2$. The difference between the adjusted $R^2$ and the $R^2$ value is about 2.5% which indicates good cross validation of this model, while the split model validation analysis supports the findings of the analysis on the full data set. Hence the model stands validated. This implies that the likelihood of the regression coefficient and parameters that will be obtained from other samples in the population being the same or similar to that of the model in this study is increased (Field, 2009).

To determine if the parameters form the model developed from this sample could become applicable beyond the sample into the population with some degree of certainty, about eight different tests of model assumptions were carried out as recommended by authors such as Robson (2002) and Field (2009). These tests include heteroscedasticity, autocorrelation, normally distributed error, multicollinearity, linearity of relationship, undue influence of cases, and normality of distribution. This model meets all the assumptions thereby implying

that that its regression coefficient and parameters are unbiased and the likelihood of these parameters being same as that of the population is increased (Field, 2009).

This model demonstrates the effect that the effectiveness of FM service has on building performance while also presenting a veritable tool to measure performance of buildings from the quality of its BSS provisions. Hence, this model indicates that FM effectiveness has a strong positive effect on building performance and that a building's performance value can be predicted from the effectiveness of its FM. Invariably, the model demonstrates the importance of FM on Building performance. Executives of organizations should therefore be sensitized to the idea that engaging effective FM service providers in their buildings will have a positive effect on it, which invariably will enhance user's productivity This is consistent with findings in previous works as Grimshaw and Keefe (1992); Oselland and Bartlett (1999) and Lindholm and Leväinen, (2006).

Authors have developed a number of conceptual frameworks for performance measurement and management in FM. Some of these are schematic models that provide guidance framework for performance evaluation and management, such as the Balanced score card by Kaplan and Norton (1992, 1996), Service Quality Framework by Parasuraman *et al.* (1988) and the EFQM Excellence Model (EFQM, 2010). Others are relational models that relate a dependent with an independent variable. Examples are the conceptual framework for measuring CREM performance by Lindholm and Leväinen, (2006) which relates FM quality to organisational performance and Stoy and Kytzie (2006) which relates occupancy cost to the cost drivers. The model developed in this current study is fundamentally different in that it demonstrates the influence of effective FM on building performance. In addition, the

model uncovered an unexplored category of variables (crises response and management), in the evaluation of the level of effectiveness of FM services. The dimensions in this category makes the model unique because it provides for the peculiar Nigerian and developing world context were FM is typically fraught with irregularities and the unexpected, invariably resulting in numerous crises such as building collapse, spate of fire disasters in building, accident, health and other emergencies including the more recent examples of kidnapping and suicide bombings.

Another recognized strength of this model is that it is a mathematical model that is capable of generating numerical performance values or scores for buildings and facility managers or building support service providers separately. Furthermore, the performance score it generates does not have to be compared with benchmark data. In other words, it can be used where there are no existing benchmark data on performance. This is because the performance value that the model generates has a possible maximum value of 9.5. Therefore, the closer a buildings performance score is to 9.5 the better its level of performance. This is supposed to be a special strength of this framework, particularly for the Nigerian situation where systematically developed benchmark data are quite few.

It is recognised that the model developed in the works of Stoy and Kytzie (2006) and Ho *et al*.'s. (2004) are also mathematical models from which numerical values of the dependent variable can be calculated. However they fill different gaps from that of the model in this study in that they are appropriate for evaluating different dependent variables i.e. occupancy cost and health and hygiene performance of buildings respectively. This current model is also different from these previous works because it is a regression model, rather than a

composite score of measures such as Apgar real estate score (Apgar, 1995), the BQA model (McDougal, 2002) and the index for measuring building health and hygiene, which is essentially an aggregate of the ratings and weightings of measures. (Ho *et al*., 2004)

The benchmarks developed in this study, also provides an avenue to evaluate the performance of individual attributes of buildings or group of attributes on a scale of 1-5. For example, in line with the index that was derived in this study, a composite mean performance score by respondents (for an attribute or group of attributes) of a sum of 1-2.5 is considered not satisfactory, 2.6-3.9 is less than satisfactory, while 4 and above is satisfactory. This is similar to the real estate score devised by Apgar (1995) where a composite mean score of all attributes of 6 in a scale of 10 is considered adequate.

This model provides five major area of effectiveness that the facility manager must focus on to enhance performance or add value to the building of the client organization. These have been identified earlier. The mean scores for each independent variable could also be obtained in a performance evaluation exercise and anyone of the variables with a mean value that is less than three (3) will require immediate attention. The mean scores will also indicate those service areas that are being most satisfactorily performed and those that are not.

It is important that when the developed mathematical model is to be applied in the evaluation of building performance the individual variables that load on each of the five factors should be identified and used as a guide in rating the factors. This is so that each assessor does not give their own semantic interpretation to the factors and so that every evaluation and comparison can be done using the same parameters. In view of this and for further

clarification, the different variables that are to be used in measuring each of the factors as obtained from this study are restated as follows:

***Factor 1 (Safe, Clean, Attractive and Functional work Environment- SCAFE)***

1) Provision of safe environment
2) Provision of satisfactory standard of cleaning
3) Provision of serene and attractive environment
4) Provision of high quality and relevant equipment
5) Effective management of maintenance functions
6) Suitability of premises and work environment to work
7) Making sure that the building meets legislative requirements
8) Completion of project to customer satisfaction

***Factor 2 (Good quality end product – GQP)***

1) Good quality end product/ensuring value for money for work done by suppliers
2) Level of absenteeism of FM staff
3) Proactive, responsive and effective FM helpdesk service
4) Effective correction of faults in the building and facilities
5) Provision of good feedback and service quality review procedure
6) High level energy performance
7) Use of quality materials in providing service
8) Avoidance of loss of business due to failure in premises services

***Factor 3 (Timeliness and Professionalism- TP)***

1) Achievement of completion deadlines
2) Friendliness and politeness of premises/FM staff
3) Competency, reliability and professionalism of the approach of premises/FM staff and their service
4) Effective communication provision and management of information

***Factor 4 (Response plan to public and building service emergencies - PBSE)***

1) Plans to prevent or respond to emergencies such as fire, safety, health and accidents.
2) Managing leakages from plumbing fittings and roof
3) Response plan to failure in public mains water and portable water supply
4) Managing unexpected breakdown of fixtures and fittings
5) Response plan to mains electricity power failure and or breakdown of alternative source of power
6) Response plan to equipment breakdown from power surges

***Factor 5 (Response plan to Poor regulatory policies and standards enforcements – PRSE)***

1) Managing incidents of adulteration of materials and fake equipment parts
2) Managing the effect of hectic and unpredictable traffic situation on quality of FM service
3) Response plan to scarcity of materials and supplies
4) Provisions for hiring qualified and reliable artisans for repair work and other projects
5) Managing effect of corruption and lack of transparency on quality of service

## 5.6 CONCLUSIONS OF THE STUDY

This study identifies 41 measures that are relevant for evaluating the effectiveness of FM in office buildings in the study area. These measures are in three categories as follows: Seven (7) in the financial, 22 in quality of service and 12 in the crises responses and management categories. It was concluded that the 31 non-financial measures of FM effectiveness that were identified in the study are under-laid by five major latent dimensions as follows: 1) Safe, Clean, Attractive and Functional Work Environment; 2) Good quality end product; 3) Timeliness and Professionalism: 4) Response plan to public and building service emergencies and 5) Response plan to Poor regulatory policies and standards enforcements. While measures in the first three dimensions (quality of service category) were found to be similar to those in past works, those in the last two (crises response and management category) were largely unexplored in previous works implying that they are more relevant to the peculiar Nigerian socio-economic context. This makes the multi-item scale of measures developed more appropriate to the Nigerian context and by extension to that of the developing world.

In the study, a statistically significant relationship was established between these five key measures of effectiveness of FM (Independent variable) and building performance (dependent variable). The study also concludes that this significant relationship is a causal one. Hence it was concluded that building performance value can be predicted from the level of effectiveness of FM, therefore, resulting in the development of a mathematical model, suitable for measuring building performance from the study. The model has attributes that demonstrates to executives of organizations and other stakeholders the importance of FM on building performance. Also because this model met a number of recognized assumptions

required to be met by a model that can be applied beyond the sample (unbiased model), it is concluded that it can be applied with some measure of certainty beyond this sample in the calculation of an absolute numerical value for the overall performance of office buildings and or some dimensions of it. The model can also be used in calculating a numerical value of the direct contribution a building's FM to its performance.

This model could be useful to a number of stakeholders in the construction industry. For building owners and developers, it could provide information on aspects of building that is performing sub-optimally and the overall and comparative performance of buildings, thereby guiding strategic decisions towards improvement in building performance. For the building occupants, it provides a useful tool for evaluating performance of different aspects of building which in turn affect productivity. For the architects and designers, it provides a useful tool for improving the performance of existing and proposed development. It also provides a measure of the success of a building's support service, towards improvement in these services. This model could also guide government and policy makers on regulation and legislations towards enhancing building performance and the protection of user's health and safety. Therefore, facilities managers, building owners, designers and developers should be sensitised to the usefulness of this model in strategic decision making and improvements in the buildings and services delivery process.

The study revealed that financial measures of performance of buildings, that relates to their performance as investment properties are less important to the Nigerian building operators, while issues of running cost or cost of occupation are quite important. Also measures that

quantify response to accidents, fires and other emergencies are regarded as very important soft measures of FM effectiveness.

With respect to the effectiveness of FM provisions in office buildings, this study concludes that aspects of functionality of the work environment and professionalism are the best performing dimensions of the FM practitioners' services. Some of the low points of their activities are high level of absenteeism and poor response plan to emergency breakdown and scarcity of material. Others are poor quality maintenance and quality review process. This study also concludes that the average rating of the effectiveness of FM services is unsatisfactory, which implies that BSS providers in the country need to improve their practical skills and knowledge base in order to enhance the effectiveness of their services.

Another conclusion of the study is that the average performance of office buildings in the study, although slightly better than that of the BSS providers is less than satisfactory. This is further demonstrated by indications that buildings in the study are performing satisfactorily only in three (3) out of the 45 building attributes that were measured. This suggests that office building owners and operators need to put substantial provisions in place to enable the offices perform at least "satisfactorily" if not "very satisfactorily". This is particularly in view of the realisation that well performing buildings improve worker's productivity. Also concluded is that internal environment satisfaction variables, such as "Safety of placement of electric socket and switches" "Overall suitability of building to organizational need" Level of office hygiene and "Efficiency and comfort of office circulation space/layout" are overall best performing aspects of office buildings rated 1$^{st}$ to 4$^{th}$. While safety, accident and fire prevention and health emergencies management are the least performing satisfaction variables in buildings.

Among the comfort group of variables, issues of internal ambient condition and configuration such as “convenience of placement of electric socket and switches” “Adequacy and freshness of natural ventilation” “Quality of natural lighting” and “Flexibility of position of furniture, fittings and equipment” are the best performing in the study. Aspects of comfort that are performing poorly are lifts, elevators and escalators” “Quality of humidity control provision” “Comfort and efficiency of sun glare prevention mechanism and quality of office eating facilities.

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The study established that there are sufficiently marked differences between the performance of building attributes in this study and those of past works probably because of the differences in the contexts of the researches. Hence, major areas of concern in these previous studies such as comfort of ambient condition (thermal and ventilation), flexibility of space layout, furniture, and physical control of equipment, are aspects that are performing most satisfactorily in this current study. Contrarily, issues of health and safety which are the least performing aspects of this study were of no major concern in past literature. This supports the notion that findings of researches on performance in FM may not be directly applicable across different socio-economic contexts.

This study concludes that it is quite relevant and necessary to develop bespoke performance evaluation scale and mathematical model such as were developed in this study, in order to provide for the special Nigerian and developing world context where FM is typically fraught with irregularities and the unexpected, which invariably results in numerous crises such as building collapse, fires, health emergencies, equipment breakdowns and disruption in services. The developed model featured the “crises response and management” category of

variables, which brought to light important measures of effectiveness for the Nigerian facilities managers, in the performance of these aspects of their role. Evidence does not indicate that this construct and its measures have been featured in previous studies. This model is therefore unique in this respect and confirms that in the Nigerian environment, a facilities manager must have adequate "crisis response and management" strategies in place in order to add value to the clients' business. Another important feature of this model is that it numerical value for the performance of buildings that it calculates can be applied practically even where there are no benchmark data for comparison.

## 5.7 RECOMMENDATIONS

Office buildings in this study are currently performing below the satisfactory level. Therefore it is recommended that owners and operators of buildings must recognise the need to improve the effectiveness of FM service in order to make buildings more functional and comfortable for users. In doing this building operators must identify those particular attributes of office building that are under performing and which are important to the users in order to improve upon them. In view of the relationship that the study established between effectiveness of FM and building performance executives of organisations must become sensitized to the idea that an increased effectiveness of their FM service will have a significant positive effect on their buildings. This invariably will enhance user's (their staff) productivity and aid the achievement of their organisational objectives.

The quality of the Nigerian BSS has to be improved upon, to make them satisfactory. The relevant training institutions and professional associations should recognise this challenge and put appropriate actions in place to improve their practical skills and knowledge base of these

practitioners in order to enhance the quality of their service. This can be achieved through improvements to the contents of the training curriculum and continuing professional development workshops. These training opportunities should lay emphasis on contextual aspects of the practise rather than on formal theories which are most times at variance with the real needs of the economy. It cannot be over emphasised that the real needs of the populace can only be uncovered through collaborative research efforts between higher institution of learning (who are already equipped with research facilities and researchers) and applicable professional bodies or institutions and regulatory bodies. Professional and regulatory bodies and even government agencies should immediately commence with giving briefs to educational institutions to carryout sponsored research to find solutions to problems that are already identified in the industry. This way, problems gets solved as soon as possible after they originate. Also, proposed solutions get applied to situations right after they are proposed, thereby providing opportunities for the revision of such solutions in an action research. This will go a long way in resolving most of the current problems with the level of effectiveness of FM services and building performance

It is recommended that Facilities managers and BSS providers generally must commence with the assessment of the level of effectiveness of their services as well as the performance of the office buildings they operate. It is recommended that they should start to utilise the model, FM performance evaluation multi-item scale and benchmarks that were developed in this study, since it has been found that it can be applied beyond the study with some measure of certainty (in view of the various required model assumptions that it met). By using these tools, facilities managers can identify aspects of their practice where they are performing optimally and areas that need attention. They can also recognise the extent to which buildings they operate are

satisfying the user's needs and attributes of buildings that needs to be improved on. The use of the tools will also help to identify any possible need for resource re-allocation and if and where the building provisions might be becoming a burden to the owners and or operators.

Facilities managers and other BSS providers must become aware that the following five dimensions of their services are very important to respondents and that to provide satisfactory services to client and make value adding contributions to the businesses of the client these dimensions must be focused on; 1) Safe, Clean, Attractive and Functional Work Environment; 2) Good quality end product; 3) Timeliness and Professionalism: 4) Response plan to public and building service emergencies and 5) Response plan to Poor regulatory policies and standards enforcements.

The need to improve on Safety, accident and fire prevention and health emergency management aspects of office buildings cannot be over-emphasised. Particularly in view of the spate of fires, accidents, health and other emergencies in the country and the accompanying unnecessary loss of lives. Stakeholders including the office building operators and owners must put appropriate emergency response plans in place to prevent unnecessary loss of lives. Such efforts should include emergency first aid provisions (equipment and medications) and emergency procedures to prepare for the unexpected e.g. fire drill and accident response procedures. Others are organised training for building occupants to prepare them for managing emergency situations, including accidents, flooding and health emergencies e.g. Cardio Pulmonary Resuscitation (CPR) procedures. It is also recommended that beyond the general training of all occupants, few occupants should be specially trained in each department or unit to handle high level medical or other emergency procedures e.g. providing first aid to people

who suddenly fall seriously ill in the office or who suffer cardiac arrests, a burn etc. The names of staff in this group, their location, phone numbers (and if it will not constitute security risks pictures) must be prominently displayed all over the building so that people can easily reach them in a medical emergency. Every office building should also be equipped with fire prevention equipment such as smoke alarm, fire sprinkler system, fire extinguisher etc. These equipment must be handy at all times and regularly serviced to ensure they are performing efficiently and always combat ready.

It is also recommended that the Nigerian National assembly should sponsor appropriate legislations that will encourage and enforce the provision of all these emergency response and prevention requirements in every building. Such acts of parliaments should also have effective enforcement provisions and procedures including appropriate sanctions for non-compliance.

There is an urgent need to recognise that a number of the building emergencies in Nigeria today such as building collapse and fire incidents emanate as consequences of people's previous and on-going attempts to make excessive monetary returns from transactions by using inferior product and by their refusal to follow due process in their dealings and transactions. It is also partly a result of the prevalence of poorly skilled artisans in the construction industry. This brings to the forefront the importance of the enactment of good standardisation policies that will regulate the quality of product and the procedures and processes for transactions throughout the national polity. The training procedures and certification of artisans should also be standardised. Regulations must also be enacted to protect the consumers from the activities of poorly skilled artisans. This must include

legislation that will make it impossible for artisans to parade their services without acquiring adequate skills and certification and specify appropriate punitive measures where they do.

It should be recognised that is not enough that these laws should be enacted it should be ensured that the accompanying sanctions for a breach of such laws are sufficient deterrents for the actions of culprits. In most cases existing laws are inadequate or totally ineffective because there are no proper enforcement mechanisms in place. This brings to the forefront the importance of ensuring that in each case the full terms of the laws are enforced as appropriate not excepting anybody no matter how highly placed such a person may be in the society. Therefore, the Construction and facilities management related associations in the country such as NIESV, IFMA, NIOB, NIA, NIS, NIQS must come together and carvers for the enactment of relevant regulatory and standardisation acts and their proper enforcement. These practitioners should recognise that so long as these provisions are not in place the societal conditions will continue to deter from their performance and they may continue to find it difficult to attain the optimal status that is required to enhance the effectiveness of their services.

The issue of energy performance has become global in view of its cost saving and environmental protection and sustainability dimensions. BSS providers in the study are not doing enough to provide their building users with buildings and equipment with effective low energy consuming power sources. Therefore, it is recommended that Nigerian FM practitioners must start to adopt global best practices in the attempt to minimise carbon emission and maximise use of resources. High level energy consumption results in high carbon emission which threatens environmental sustainability through its negative effects

including climate change which ultimately threatens human survival. Some of the ways to conserve energy in office buildings is to change to use of low energy consumption equipment (air-conditioners, computers and fridges), including use of low wattage and motion sensor bulbs that can come on and go off with motion whenever it is dark. BSS providers must sensitise building owner to the need to provide them with the required support to change existing equipment to those that will meet the required standards by convincing them with available information on how important this aspect of their societal responsibility is and also with fact and figures of cost savings of use of low energy consumption equipment. Again there is a need for the National Assembly to enact appropriate laws to encourage and enforce compliance with the use of these low energy consumption equipment and materials particularly in view of its societal responsibility perspective. It should be recognised that without such laws and their enforcement many building owners and operators will be slow to comply with these requirements (it is so, even in the developed world), while others may never do, because of the initial cost and effort of compliance.

### 5.8.1 Contributions to Knowledge

1. The study developed an adaptable multi-item scale for the assessment of the effectiveness of FM by building users. This scale introduced a new measurement category i.e. “crises response and management” which comprises two major dimensions i.e. “response plan to building and public service emergency” and “response plan to regulatory policies and standards enforcements” These dimensions make the scale contextual to the Nigerian crises prone socio-cultural environment and by extension to those of the developing world.

2. The study indicated that the Nigerian FM market is plagued by two important factors, i.e. “poor regulatory policies and standards enforcement” and poor response to building and public service emergencies. Hence practitioners must have good response mechanisms for these two factors, in order to have a successful practice.

3. This study developed a mathematical model for evaluating the performance of office buildings and the contribution of the buildings’ support service providers to their performance. This is probably the first of its kind and if applied properly it would serve as a veritable, easy to use tool that is devoid of the applicability issues that the existing FM performance evaluation tools have in Nigeria.

4. The study established both financial and non-financial performance benchmarks for office buildings in Lagos Metropolis. The benchmarks if applied appropriately would enable building owners and service providers to compare performance in the sector and to identify areas of improvement towards more successful delivery of productive office buildings

5. Using user’s perception of performance of office buildings in Lagos the study established that office buildings are performing less than satisfactorily and that buildings managed with strategic FM principles perform better than the non-strategic FM managed ones.

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### 5.9 Areas of Further Studies

Possible directions for further research as indicated in this study are as follows:

1) The FM effectiveness factors that were used in developing the model of building performance value in this study are by no means exhaustive and were responsible for 63% of the variation in the outcome (building performance). Further studies can be done to identify other measures and factors that accounts for the remaining variations.

2) The focus of this study is office buildings; hence the study can be replicated on other building types such as institutional, residential and commercial buildings, to identify possible differences in findings that the different building types might produce.

3) The study considered only Lagos metropolis. Further research can be carried out to establish prevailing situation in other states in Nigeria, particularly Abuja and Port-Harcourt where FM is starting to gain some footing.

4) Attempt can be made to replicate aspects of this study in some other developing countries, particularly the development of a contextual scale for measuring effectiveness of FM.

5) This study concentrated on issues of performance of FM and buildings in the Nigerian context. Other aspects of FM such as its nature and scope in Nigerian, its major challenges and the solutions, outsourcing, etc., can be examined in further studies.

6) Further researches could be carried out to develop contextual financial benchmarks that will reflect important cost centres

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**APPENDIX 1**

**INFLUENCE OF FACILITIES MANAGEMENT ON PERFORMANCE OF OFFICE BUILDINGS IN LAGOS METROPOLIS**

**QUESTIONNAIRE FOR BUILDING OCCUPANTS/USERS**

Dear Sir/ Madam,

This research examines the effect of application of Facilities management (FM) principles on the performance of office buildings. For the purpose of the research the word "office" is used to refer to not just the building structure, but also the facilities and fittings provided within it and in its environment. The attached questionnaire has been designed to elicit the required response and information on the nature and scope of FM applications in office buildings, Key measures of effectiveness of FM services in office buildings and invariably to propose a framework for effective measurement of the performance of the office buildings. The study aims to come up with suggestions on ways to improve the level of satisfaction and comfort that will be derivable from office buildings and inadvertently to improve the performance of the users of the buildings.
The researcher seeks your kind cooperation in completing the questionnaire. You are assured that all the information that you provide will be treated with utmost confidentiality and used only for academic purposes. The researcher highly appreciates the time and effort spent in completing this questionnaire and looks forward to receiving the completed copies soonest

Thank you very much.

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**PART A**

**BACKGROUND INFORMATION**

**Please fill in or check X as appropriate**

1) What is your company's name? (Optional) ----------

2) What is the area of specialisation of the company you work for?.....

3) Kindly provide the address of the building in which your office is located……

4) In which local government within Lagos state is this building located?
---

5) For how many years have you as an individual, been an occupant in this building?
☐ Less than 1 year ☐ 0-2 years ☐ 3-5years

☐ 6-10years ☐ 11-20years ☐ above 20years

6) State your work designation within the company
☐ Chairman/Chief Executive ☐ Manager ☐ Senior Officers

☐ Junior Officers ☐ Office Assistants ☐ Any other (Pls specify--------

7) Please indicate your gender ☐ Male ☐ Female

8) What is your highest academic qualification?
☐ Primary School leaving certificate ☐ SSCE ☐ OND ☐ HND

☐ BSc ☐ MSc ☐ PGC ☐ PGD ☐ PhD

Others, pls specify----------

9) Please indicate your current age ☐ 18-25 years ☐ 26-35years

☐ 36-45years ☐ 46-55years ☐ above 55years

**PART B**

**KEY MEASURES OF EFFECTIVENESS FOR FACILITIES MANAGERS/ BUILDING SUPPORT SERVICE PROVIDERS**

**Please fill in or check X as appropriate**

10) Please rate the following measures according to how important they are in your opinion in determining the effectiveness of the facilities managers or other office building support service providers. The use of the phrase "facilities manager" as above is used to refer to managers who adopt FM principles in the management of their facilities. Those who do not are refered to as "building support service providers". The listed factors have been divided into two (2) broad categories. Category one (1) focuses on those that determine the quality of service that you derive from the building. The second category of factors relate to the managers' response and management of crises and uncertainties that he/she may likely experience in relation to his/her role as a building manager . Please rate the measures on a scale of 1 – 5, where 1 represents **not important**, 2 **hardly important**, 3 **important** and 4 **very important**. You are required to read through the whole section first, before attempting to answer the questions

| S/No | Performance measures for Facilities Mgr/Building support Service Provider | Very Important (5) | Important (4) | Somewhat Important (3) | Hardly Important (2) | Not Important (1) |
|---|---|---|---|---|---|---|
| | **Quality of Service Measures** | | | | | |
| 1 | Avoidance of loss of business due to failure in premises services | | | | | |
| 2 | Satisfaction with facilities and physical working condition | | | | | |
| 3 | Provision of safe environment | | | | | |
| 4 | Provision of serene and attractive environment | | | | | |
| 5 | Customer satisfaction with facilities | | | | | |
| 6 | Suitability of building, fittings and environment to work | | | | | |
| 7 | Provision of relevant and high quality equipment | | | | | |
| 8 | Effectiveness of communication provisions and management of information | | | | | |
| 9 | Reliability of building support services | | | | | |
| 10 | Effectiveness and proactive complaint/ helpdesk service | | | | | |
| 11 | High level competence and professional approach of the premises staff | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | Friendly and courteous premises staff | | | | | |
| 13 | Responsiveness of FM department | | | | | |
| 14 | Effective management of maintenance functions | | | | | |
| 15 | Level of Absenteeism of FM/ Premises staff | | | | | |
| 16 | Satisfactory Standard of Cleaning | | | | | |
| 17 | Completion of work i.e. repairs, improvement and maintenance to customer requirement and time deadlines | | | | | |
| 18 | Good Quality end product and ensuring value for work done by suppliers | | | | | |
| 19 | Use of quality materials in providing services | | | | | |
| 20 | Ability to meet Legislative requirement in building | | | | | |
| 21 | High level of energy performance i.e. effective and cheap electricity | | | | | |
| 22 | Effective and timely correction of faults | | | | | |
| | **Crises Response and Management Factors** | | | | | |
| 23 | Response plan to mains electric power outages and other sources of power | | | | | |
| 24 | Response plan to failure in Public mains water and other water supply sources | | | | | |
| 25 | Managing instances of adulteration and fake equipment and spare parts | | | | | |
| 26 | Response plan to scarcity of required items e.g. fuel or machine spare parts | | | | | |
| 27 | Provision to ensure that only qualified and efficient artisans are engaged | | | | | |
| 28 | Managing effect of hectic and unpredictable traffic situation on quality of service | | | | | |
| 29 | Prevention of fire accidents and health emergencies in the building | | | | | |
| 30 | Plan of action in case there is fire, accidents or other emergencies in the building | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 31 | Managing effect of corruption and lack of transparency of service officials and artisans on quality of service | | | | | |
| 32 | Managing unexpected breakdown of fixtures and fittings e.g. toilet fittings | | | | | |
| 33 | Response plan to Breakdown of equipment (computer or air conditioner etc.) as a result of fluctuation in electricity frequencies (power surges) | | | | | |
| 34 | Provision for response to Leakages; plumbing fittings and roof | | | | | |
| 35 | Please state below any other measure that is important to you | | | | | |

**PART C - SECTION 1**

**RATING OF BUILDING PERFORMANCE**

**Please fill in the space provided or check X as appropriate**

11) Please rate the following building performance attributes according to the level of satisfaction or comfort which in your opinion, the building provides for you as an occupier. The choices have been divided into two (2) major categories. Category one (1) focuses on factors that determine the level of satisfaction that users derive from the building while the second category concentrates on those factors that determine user comfort. You are required to read through the whole section first, before attempting to answer the questions.

Respondents are to rate the satisfaction factors on the basis of how well these factors makes them productive at work and comfort factors in terms of how comfortable they make them so that they can be able to achieve company objectives. The measures are to be rated using a scale of 1–5 where **1 represents Not satisfactory or not comfortable, 2 Less satisfactory or less comfortable, 3 Satisfactory or comfortable and 4 represents Very satisfactory or very comfortable.**

| S/N | Building Performance Indicators | Very Satisfact-ory(5) | Satisfac-tory (4) | Less Satisfac-tory (3) | Somewhat Satisfac-tory (2) | Not Satisfac-Tory (1) |
|---|---|---|---|---|---|---|
| | **Satisfaction factors** | | | | | |
| 1 | Safety of placement of electric sockets and switches | | | | | |
| 2 | Convenience and privacy of location of telephone points within the building | | | | | |
| 3 | Adequacy of location of fire alarm, fire extinguisher smoke detector and other fire safety fittings and equipments | | | | | |
| 4 | Adequacy of fire prevention provisions | | | | | |
| 5 | Adequacy of equipments such as computer printer, copiers, softwares etc. | | | | | |
| 6 | Efficiency of office circulation and movement space and layout | | | | | |
| 7 | Quality of the furniture and fittings | | | | | |
| 8 | Quality of office equipments | | | | | |
| 9 | Adequacy of the size of of each office space to the work going on inside it | | | | | |
| 10 | Efficiency of the location of each office in relation to other offices within the department | | | | | |
| 11 | Overall suitability of building to organisational need | | | | | |
| 12 | Level of privacy of office and protection from internal or external distractions | | | | | |
| 13 | Level of office hygiene | | | | | |
| 14 | Adequacy and efficiency of car parking provisions | | | | | |
| 15 | Adequacy of signage and direction displays eg sign to toilet, canteen, exit etc (are they copious) | | | | | |
| 16 | Safety and security of doors and gates | | | | | |
| 17 | Adequacy of anti-burglary and theft provisions | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | Quality of lift/ excalators and adequacy its safety provisions e.g. emergency stop, excess weight indicator, uniterrupted power supply | | | | | |
| 19 | Efficiency and adequacy of First aid provisions eg breathing aparatus | | | | | |
| 20 | Efficiency of waste management facilities | | | | | |
| 21 | Efficiency of mains electric power and emergency power provisions | | | | | |
| 22 | Adequacy and convenience of water supply sources including potable water | | | | | |
| 23 | Efficiency of work if different from private offices | | | | | |
| 24 | Adequacy of staff personal storage space such as drawer, book cabinets, etc., particularly for general offices | | | | | |
| 25 | Adequacy of building health and safety and emergrncy provision | | | | | |
| 26 | Adequacy of overall building security provision | | | | | |
| 27 | Adequacy of overall accident prevention provision | | | | | |
| 29 | Convenience of placement of electric power sockets and switches | | | | | |
| 30 | Flexibility of position of furnitures, fittings and equipment to suit user's needs | | | | | |
| 31 | Comfort of the furnitures e.g height of desk to seat, backrest, etc | | | | | |
| 32 | Quality of natural lighting | | | | | |
| 33 | Flexibility of electric lighting to suit ambient conditions | | | | | |
| 34 | Adequacy and freshness of natural ventilation eg. appropriate window and door positioning etc. | | | | | |
| 35 | Comfort of lifts, elevators and escalators e.g. adequate ventilation, sufficient interior space | | | | | |
| 36 | Comfort and cleanliness of canteen and eating facilities | | | | | |
| 37 | Comfort and cleanliness of sanitary facilities such as toilet | | | | | |
| 38 | Natural temperature comfort within the building (Hot and cold) | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 39 | Quality of humidity control provision | | | | | |
| 40 | Comfort and efficiency of air-conditioning systems | | | | | |
| 41 | Comfort and Efficiency of sun glare prevention mechanism | | | | | |
| 42 | Eficiency of internal noise prevention mechanism, (people, AC, photocopiers, printers etc.) | | | | | |
| 43 | Efficiency of External noise prevention facilities (generator, car hooting, social and religious functions, vehicles, construction etc.) | | | | | |
| 44 | Flexibility of automated equipment control to suit needs, (equipment like airconditioner, doors window blinds etc). | | | | | |
| 45 | Ease of retrieving stored work material and records from achive | | | | | |

**PART C – SECTION 2**

**RATING OF EFFECTIVENESS OF FACILITIES MANAGER/BUILDING SUPPORT SERVICE PROVIDERS**

**Please fill in or check (X) as appropriate**

12) Please rate the effectiveness of the facilities manager or building support service provider for the building you occupy, using the following measures. The choices have been divided into two (2) major categories. Category one (1) focuses on factors that relate to the quality of service provided by the managers to the occupiers, while the second category are factors relating to the ability of the building manager to respond to crises and uncertainties in the buildings (regarding the building) and the efficacy of these responses. You are required to read through the whole section first, before attempting to answer the questions

Effectineness of service is to be rated based on how efficiently and effectively the service providers provide the required services. Response to crises should be rated on if there is a provision in place to minimise effect of these crises and uncertainties and how effective these interventions are. In buildings where these crises have been absent, how effectively have they been prevented.

| S/N | Building support/ facilities Manager Performance Indicators | Very satisfac-tory (5) | Satisfac-tory (4) | Somewhat Satisfac-tory (3) | Less satisfa-ctory (2) | Not Satisfa-ctory (1) |
|---|---|---|---|---|---|---|
| | **Quality of Service** | | | | | |
| 1 | Avoidance of loss of business due to failure in premises services | | | | | |
| 2 | Completion of project to customer satisfaction | | | | | |
| 3 | Achievement of completion deadlines (completing project, repair and maintenance work on time) | | | | | |
| 4 | Friendliness and politeness of premises/FM staff | | | | | |
| 5 | Competency, reliability and professionalism of the approach of premises/FM staff and their service | | | | | |
| 6 | Proactive, Responsive and effective FM helpdesk service (helpdesk is where complaints are reported) | | | | | |
| 7 | Provision of serene and attractive environment | | | | | |
| 8 | Provision of safe environment | | | | | |
| 9 | Provision of Satisfactory standard of cleaning | | | | | |
| 10 | Provision of high quality and relevant equipment | | | | | |
| 11 | Effective management of maintenance functions | | | | | |
| 12 | Suitability of premises and work environment to work | | | | | |
| 13 | Good quality end product/ensuring Value for money for work done by suppliers | | | | | |
| 14 | Effective correction of faults in the building and facilities | | | | | |
| 15 | Use of quality materials in providing service | | | | | |
| 16 | Effective communication provision and management of Information | | | | | |
| 17 | High level of energy performance (effective, steady and cheap electricity supply) | | | | | |
| 18 | Making sure that the building meets Legislative requirements | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 | Provision of good feedback and service quality review procedure | | | | | |
| 20 | Level of Absenteeism of FM Staff | | | | | |
| | **Response to Crises** | | | | | |
| 21 | Response plan to mains electricity power failure and or breakdown of alternative source of power (e.g. Generator) | | | | | |
| 22 | Response plan to failure in Public mains water and portable water supply | | | | | |
| 23 | Managing incidents of adulteration of materials and fake equipment parts | | | | | |
| 24 | Managing the effect of hectic and unpredictable traffic situation on quality of FM service | | | | | |
| 25 | Response plan to scarcity of materials and supplies e.g. fuel and spare parts | | | | | |
| 26 | Provisions for hiring qualified and reliable artisans for repair work & other projects | | | | | |
| 27 | Response plan to equipment breakdown (e.g. Computer, air conditioner, photocopier, etc.) | | | | | |
| 28 | Managing effect of corruption and lack of transparency on quality of service | | | | | |
| 29 | Managing unexpected breakdown of fixtures and fittings e.g. toilet fittings, lifts etc. | | | | | |
| 30 | Managing Leakages from plumbing fittings and roof | | | | | |
| 31 | Plans to prevent or respond to fire and other accidents | | | | | |

**Thank you for your cooperation**

**APPENDIX 2**

**INFLUENCE OF FACILITIES MANAGEMENT ON PERFORMANCE OF OFFICE BUILDINGS IN LAGOS METROPOLIS**

**QUESTIONNAIRE FOR BUILDING SUPPORT SERVICE PROVIDERS/FACILITIES MANAGER**

Dear Sir/ Madam,

This research examines the influence of Facilities management (FM) on office building performance. For the purpose of the research the word "office" is used to refer to not just the building structure, but also the facilities and fittings provided within it and in its physical environment. The attached questionnaire has been designed to elicit the required response and information on whether the application of FM principle has a positive effect on the performance of office buildings. This is towards making recommendations for improving the performance of buildings and that of building support service providers.
The researcher seeks your kind cooperation in completing the questionnaire. You are assured that all the information that you provide will be treated with utmost confidentiality and used only for academic purposes. The researcher highly appreciates the time and effort spent in completing this questionnaire and looks forward to receiving the completed copies soon.

Thank you very much.

H. A. Koleoso
Department of Building
Faculty of Environmental Sciences
University of Lagos
E-mail: Hikaban@yahoo.co.uk
Telephone: 08023977639 and 01-8781050

**PART A**
**BACKGROUND INFORMATION**
**Please fill in the space provided or check X as appropriate**
Kindly provide your responses to questions 1-11 below as it relates to **one** organisation or office building for which you provide building support.

1) Please state the name of the company for which you provide building support services (Optional)

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2) Please state the address of the building in which this company is located

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3) Please state any special name by which this building is known or addressed

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4) In which local government area of Lagos state is this building located?

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5) What is the age of this building?

☐ Less than 1 year ☐ 1-5years ☐ 6-10years

☐ 11-15years ☐ 16-20years above 20years

6) How many floors does this building have?----------

7) Please state the total gross floor area of this building----------

8) Are you an employee of the organisation under reference?
☐ Yes ☐ No

9) If the answer to (8) above is "No" and you provide building support service to the organisationon on an out-sourced bases please provide the name of the management company that you are afiliated to or that you work with

---

10) As an individual how many years have you been involved with the management of the building under reference?
☐ Less than 1 year ☐ 1-5years ☐ 6-10years

☐ 11-15years ☐ 16 – 20yrs ☐ above 20years

11) State your work designation within the Company

Chairman/Chief Executive ☐ Manager ☐ Senior Officer ☐

Junior Officer ☐ Office assistant ☐ (Others, Pls specify----------

12) What is your highest academic qualification? ☐ Primary School leaving

☐ SSCE ☐ OND ☐ HND/ BSc ☐ MSc

☐ PgC/PgD ☐ PhD Others (Pls specify)----------

13) What are your professional qualifications? ☐ ANIVS ☐ FNIVS

MNITP ☐ MNIE ☐ MNIQS ☐ MIFMA ☐ MNIA ☐

Others (Pls specify)----------

14) Please state all professional associations that you are affiliated to or that you are member of

☐ NIESV ☐ NIA ☐ NITP ☐ NIB ☐ NIE

☐ NIQS ☐ RICS ☐ IFMA ☐ BIFM

Others (Pls specify)----------

15) Please indicate your gender ☐ Male ☐ Female

16) Please indicate your current age ☐ 18-25 years ☐ 26-35years

☐ 36-45years ☐ 46-55years ☐ above 55years

**PART B**

**DETERMINING KEY FINANCIAL MEASURES OF EFFECTIVENESS OF FACILITIES MANAGEMENT**

**Please fill in or check X as appropriate**

17) Please rate the following **financial measures of effectiveness of facilities management** according to how important they are in your opinion in determining performance. You are to be guided in your ratings on the basis of how **practicable the measures are in the Nigerian context and how measurable and easy to use they are**. You are required to read through the whole of this section first, before attempting to answer the questions.

| **S/N** | **Financial Building Performance Measures** | **Very Importan t (5)** | **Impor-tant (4)** | **Somewhat Impor-tant (3)** | **Hardly Impor-tant (2)** | **Not Impor -tant (1)** |
|---|---|---|---|---|---|---|
| 1 | Occupancy cost per annum, per square metre or foot | | | | | |
| 2 | Total asset value per employee | | | | | |
| 3 | Total operating cost per annum per square metre | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | Maintenance cost per square metre or foot | | | | | |
| 5 | Rent earned by building per square metre | | | | | |
| 6 | Total operating cost per square metre for individual major items of overheard, eg. electricity/power/gen, cleaning, waste disposal, communication etc. | | | | | |
| 7 | Average annual percentage of vacancy in property (demand) | | | | | |
| 8 | Number of prospective tenants who show interests in renting space per month | | | | | |

**PART C – SECTION 1**

**RATING OF EFFICIENCY OF FACILITIES MANAGER/BUILDING SUPPORT SERVICE PROVIDER**

**Please fill in details as appropriate**

Please rate the efficiency of your sevices as a facilities manager or building support service provider for the building under reference using the financial measures in the table below. Kindly read through the whole section first, before attempting to answer the questions

| S/N | Financial Performance Indicators | Value in figure (Naira/$m^2$) |
|---|---|---|
| 1 | Total annual operating cost on building /$m^2$ | |
| 2 | Total number of employees in building/$m^2$ | |
| 3 | Total annual Occupancy cost/$m^2$ | |
| 4 | Total annual maintenance cost/$m^2$ | |
| 5 | Total asset value | |
| 6 | Annual rent on building /$m^2$ if applicable | |
| 7 | Average annual increase in rent | |
| 8 | Average number of enquiries for space in building by prospective tenants per month | |
| 9 | Total Gross floor area of building in metre square (all floors) | |
| 10 | Total operating cost per meter square for individual major overheard items, i.e. power/electricity/gen, communication, cleaning and waste disposal. | |

18) Kindly state the average values for the various financial measures listed in the table below as they apply to the building under reference.

**PART C – SECTION 2**
**RATING OF FINANCIAL PERFORMANCE OF OFFICE BUILDINGS**
**Please fill in details as appropriate**

Please rate the financila performance of the buildings you manage using the measures in the tables below.
Kindly read through the whole section first, before attempting to answer the questions

19) Kindly state the average values for the various financial measures listed in the table below as they apply to the building under reference.

| S/N | Financial Performance Measures | Value in figure (Naira) |
|---|---|---|
| 1 | Total annual operating cost of building | |
| 2 | Total number of employees in building | |
| 3 | Total annual occupancy cost | |
| 4 | Total annual maintenance cost | |
| 5 | Total asset value | |
| 6 | Annual rent earned by building | |
| 7 | Average annual increase in rent | |
| 8 | Average number of enquiries for space in building by prospective tenants per month | |
| 9 | Total Gross floor area of building in metre square (all floors) | |
| 10 | Total operating cost for individual major overheard items such as power (electricity/generators), ICT / communication, cleaning and waste disposal.<br>Pls specify which item the figure provided relates to. | |

**Thank you for your cooperation**

**APPENDIX 3: An Example of the Letters Introducing the Research Assistants to Respondents in the Oil and Banking Industries (Pilot Study Stage)**

Prof. R.O.A. Iyagba

Department of Building

Faculty of Environmental Sciences

University of Lagos

9th Dec, 2009

To Whom It May Concern:

**RESEARCH ON PERFORMANCE OF OFFICE BUILDINGS IN LAGOS**

The bearers Messrs. Ajayi Opeyemi and Akinnusi Temidayo are students of the Department of Estate Management, Faculty of Environmental Sciences in the University of Lagos. They are serving as research assistants for a study that is being undertaken in the Department of Building under the Supervision of Mrs H.A. Koleoso.

The research examines the effect of the application of Facilities Management principle on the performance of office buildings. It also seeks to determine if office building support service providers understand the needs of the occupants/users of the buildings. This is towards making recommendations for improving the performance of buildings and that of facility managers.

The researchers seek your kind cooperation in completing a questionnaire which will be handed to you by the bearers. You are assured that all the information that you provide will be treated with utmost confidentiality and used only for academic purposes. The researchers highly appreciate the time and effort spent in completing this questionnaire and looks forward to receiving the completed copies soonest.

Thank you.

**Prof R.O.A. Iyagba**
Dept of Building
University of Lagos

**H.A.Koleoso**
Department of Building
University of Lagos

**APPENDIX 4: An Example of the Letters Introducing the Research Assistants to Respondents in the Oil and Banking Industries (Field Study Stage)**

12th September, 2010

Mr. Martins Okolo

Chevron Nigeria Ltd.

Lekki, Eti-Osa

Lagos

Dear Sir,

**RESEARCH ON FACILITIES MANAGEMENT AND PERFORMANCE OF OFFICE BUILDINGS IN LAGOS**

The bearer is Mr. Babatunde Eleshin. He is serving as a research assistant to Mrs H.A. Koleoso on a research that is being undertaken in the Department of Building, University of Lagos.

The research examines the effect of the application of Facilities Management principle on the performance of office buildings. It also seeks to determine if office building support service providers understand the needs of the occupants/users of the buildings. This is towards making recommendations for improving the performance of buildings and that of facility managers.

The researchers seek your kind cooperation and permission to include your Head Office in Lekki in our sample and in providing us randomly with (9) users of this building that are members of staff and another (3) three from the Facilities Management Department to complete a questionnaire each. These questionnaires will be handed to you by the bearer. **You are assured that all the information that you provide will be treated with utmost confidentiality and used only for academic purposes**. The researchers highly appreciate the time and effort spent in completing these questionnaires and look forward to receiving the completed copies soonest.

Mrs Koleoso is a lecturer in the Department of Estate Management, University of Lagos and she is undertaken the research under the Supervision of Prof. R.O.A. Iyagba also a lecturer in the same University.

Thank you.

**H.A.Koleoso**

Department of Estate Management

University of Lagos

**Prof R.O.A. Iyagba**

Dept of Building

University of Lagos